Welding Engineer

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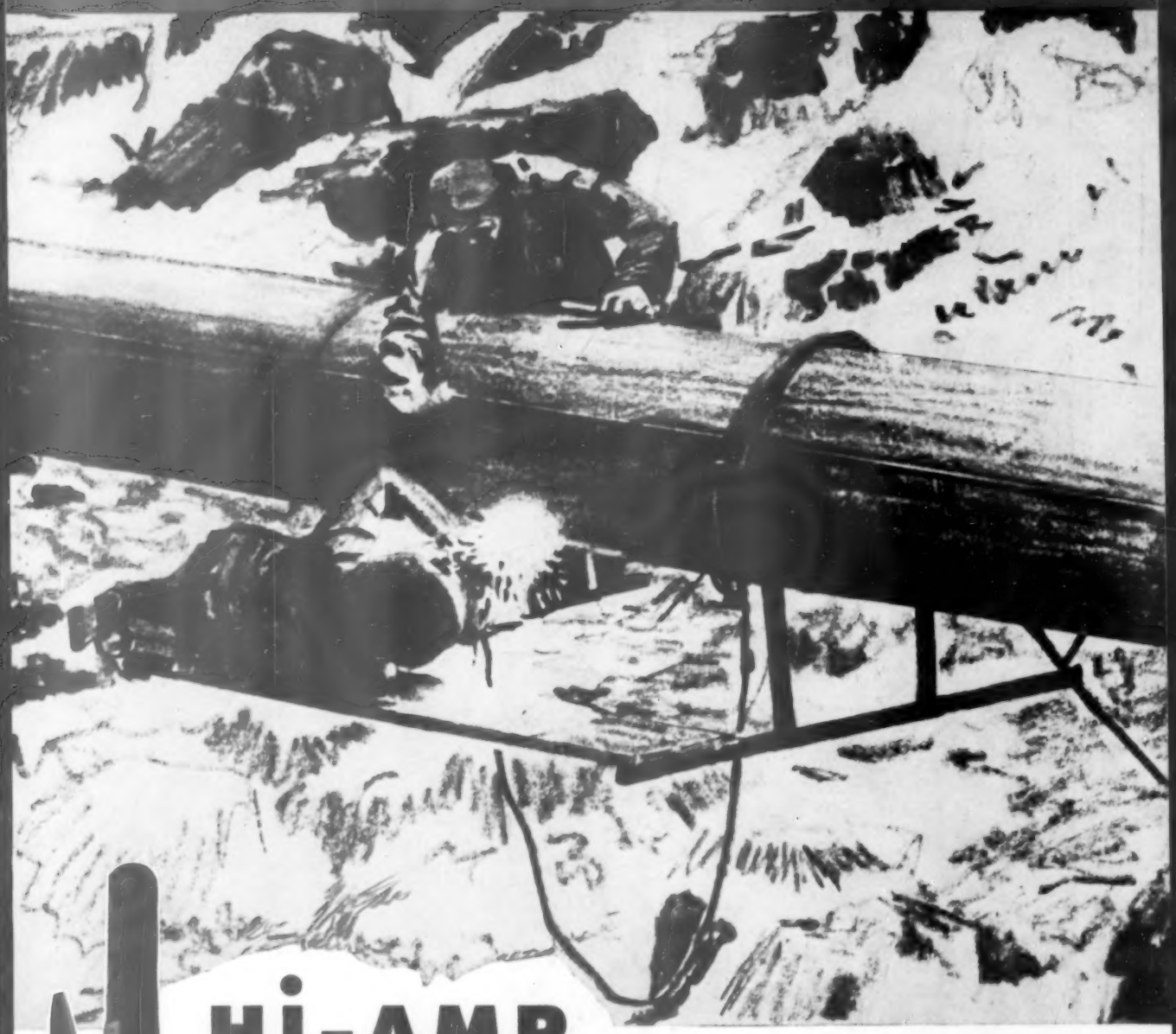
MAY, 1955

Distributor Issue



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Wherever a major welding project is in progress, Welders invariably depend on HI-AMP Electrode Holders, Ground Attachments, Ground Clamps and other Wagner HI-AMP Products . . . For Industry has long acknowledged you can't go wrong when you "Weld With Wagner". Wagner HI-AMP Products are sold only through Welding Supply Distributors throughout the U. S. and Canada.

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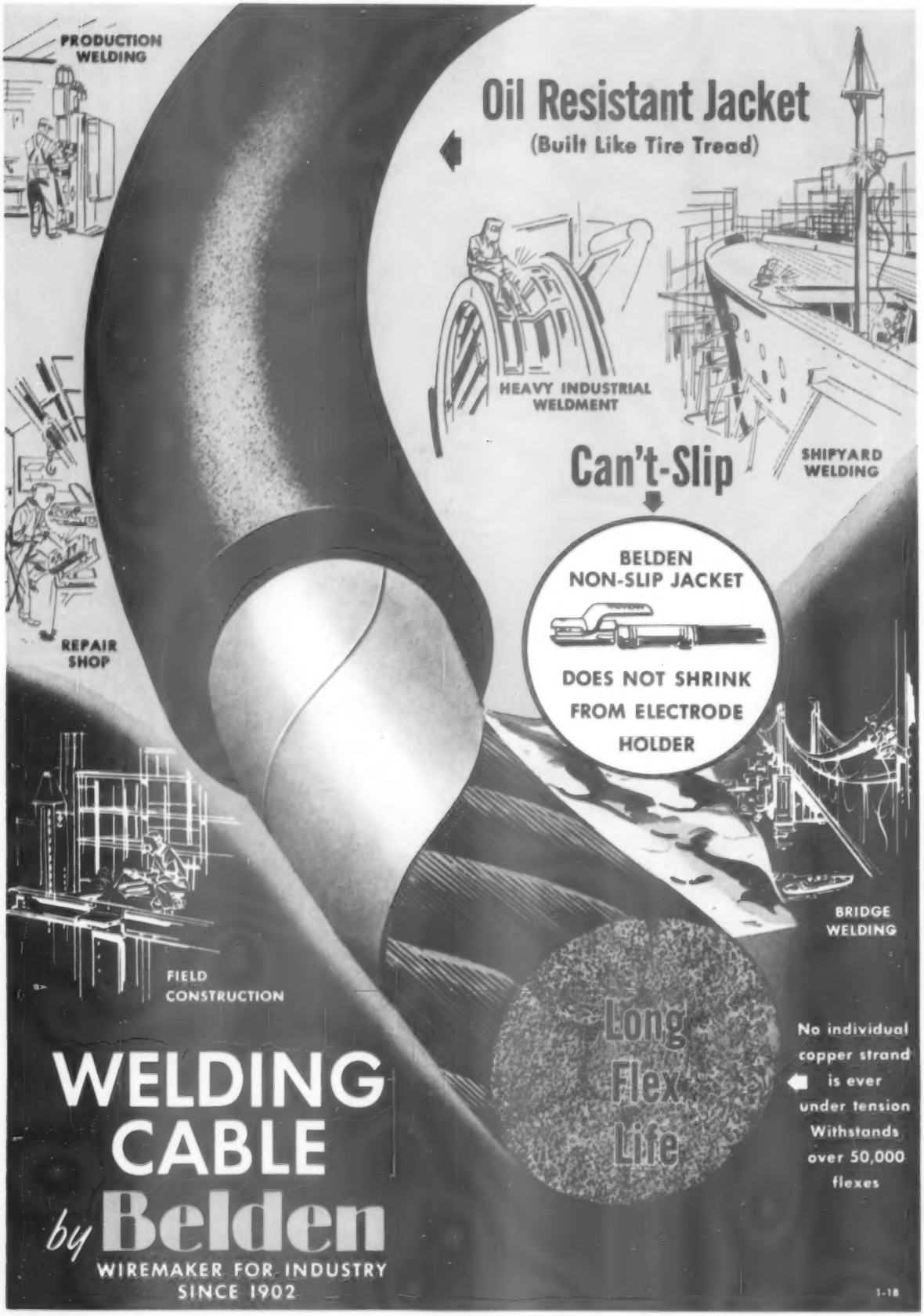
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No individual copper strand is ever under tension Withstands over 50,000 flexes
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WIREMAKER FOR INDUSTRY SINCE 1902
1-18

Hobart 900-ampere "Powromatic" Constant Voltage Welder connected to a tractor driven welding head for welding deck plate in the construction of river barges. Hobart's simplified, lightweight control kit is shown mounted on the tractor.

Photo courtesy of Maxon Construction Co., Marine Division, Tell City, Indiana

Maxon simplified production and increased weld rate with this—

HOBART CV POWROMATIC

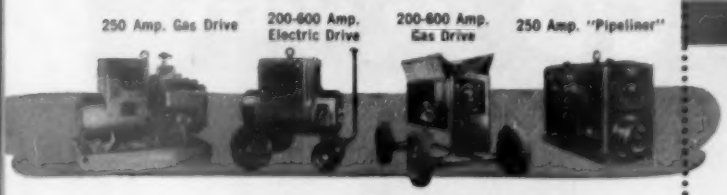
a *NEW* "Simplified" WELDER and CONTROLS for Automatic Welding

"Powromatic" is Hobart's constant voltage power source and simplified controls for all automatic and semi-automatic welding processes.

MARINE DIVISION of Maxon Construction Co., Tell City, Indiana, recently began using a "Powromatic" welder to weld 5/16 and 3/8-inch barge deck plate. The length of the weld is approximately 85 feet with torch cut edges and no back-up on the butt joint. Conventional equipment was replaced by "Powromatic" because of easier arc control and the reduction of weight on the tractor type head, making it more maneuverable and easier to manipulate. Through the use of Hobart CV, the weld rate was increased from 30 to 40 inches per minute and the operation was greatly simplified.

OTHER ADVANTAGES found in the Hobart "Powromatic" welder and controls are: The operator is assured of a constant arc voltage because the brushes on the main generator end of the unit can be adjusted so that the voltage drop in extended welding cable is compensated for by a slightly rising voltage characteristic. And the arc voltage of Hobart's "Powromatic" remains constant even when there are fluctuations in the input voltage. It completely eliminates burn-back and burn-through due to arc voltage fluctuations.

THE SIMPLICITY and superior control of Hobart "Powromatic" welders are reducing manufacturing costs wherever they are installed. If you use automatic welding now, or intend to in the future, you should investigate "Powromatic." Check coupon and return for complete details.



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- ☐ Complete information on Hobart CV POWROMATIC and Heads for Automatic Welding.
- ☐ Tell me how we can simplify Automatic Welding with our present Heads by using Hobart POWROMATIC.
- ☐ Send latest HOBART Simplified Arc Welder Catalog.

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Welding Engineer

MAY, 1955
Vol. 40—No. 5

A MAGAZINE OF JOINING AND SEVERING OF METALS

America's pioneer publication which, combined with The Acetylene Journal, has been devoted to the interest of the welding and allied industries since 1898

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HEADGEAR
Part No. 62

This headgear has been furnished on all Jackson fiber glass helmets and remains available.

It permits fitting to the head in ⅛" steps, clearly marked in hat sizes for quick, yet firm adjustment before putting the helmet on.

Now You Have the Choice of All Jackson Welding Helmets at No Extra Cost, with the...

NEW Jackson ADJUST-O-LOK

It *adjusts* quickly, *locks* firmly *after* putting the helmet on. Its fine adjustment permits tightening or loosening while wearing the helmet, as you may require. The large, winged knob is easy to handle, even while wearing gloves.

The mechanism, entirely enclosed, smooth against the head, has a minimum of moving parts. Both *knob* and *gear* are of Nylon, lightweight, and non-conductive.

This new ADJUST-O-LOK Headgear is interchangeable with the No. 62 headgear, attaches to the same Jackson friction pivots, adjustable from the outside while in use. Plastic straps, of a new formula, are stronger, self-extinguishing. They're easy to clean. Cork-padded sweatband snaps on quickly, is inexpensive to replace.

. . . CHOOSE FROM THESE JACKSON FIBER GLASS HELMETS . . .

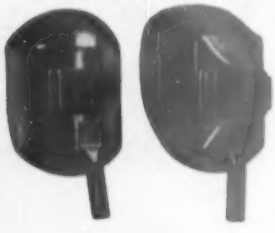
FIXED-FRONT type H-1
Available with metal lens holder or with the new, high-impact plastic lens holder as shown above.

LIFT-FRONT type H-2
permits work inspection without raising entire helmet. Lens holder of high-impact thermosetting plastic has hinged door held by coil springs. Cover glass protects filter lens; another glass protects the eyes when front is raised.

FIXED-FRONT type H-3
of narrow-front design. All parts are interchangeable with type H-1. With metal or plastic lens holder.

LIFT-FRONT type H-4
This narrow-front, fiber-glass helmet has the same parts as type H-2, including plastic lens holder with hinged door for quick work inspection.

—WITH EITHER ADJUST-O-LOK OR HEADGEAR NO. 62



Also New . . .
HANDSHIELDS H-5 and H-6
They consist of the same fiber glass shells as Helmets H-1 and H-3 respectively, and are fitted with new plastic insulated fixed-front lens retainers and vulcanized fiber handles.

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SOLD THROUGH DISTRIBUTORS AND DEALERS THROUGHOUT THE WORLD

HOBART welding distributor opens new office in Chicago at 4815 W. Diversey Ave.

FUSION welding of titanium is done in a gas-tight zippered plastic tent

NEWS

New welding distributor opens in Chicago

A recent addition to the ranks of Chicago welding supply distributors is Hobart North Welding Supply, Inc., 4815 W. Diversey Ave.

Co-owners of the firm are Ed Mors and Vern Miller. The former had been associated for the past 15 years with Johnson Welding Equipment Co., Inc., also of Chicago. The latter is president of H. K. Miller, Inc. (Hobart Welder Sales & Service), another distributor organization on the Windy City's south side. Lou Shem is office manager of the new firm.

In addition to the complete line of Hobart welding equipment and accessories, Hobart North handles equipment manufactured by Victor Equipment Co., A. O. Smith Corp., Mid-States Welder Mfg. Co. and Bay State Abrasive Products Co.

A huge colorful sign, about 25 by 30 ft, adorns the west wall of the building housing the firm.

* * *

Harnischfeger host to 1,000 at open house

Harnischfeger Corp. played host to almost 1,000 persons at the annual sales conference and open house held at its Milwaukee plant. The visitors saw construction and industrial equipment which included: welding equipment, cranes, shovels, diesel engines, hoists, soil stabilizers and the new elevating loader.

* * *

53,639 persons attend Western Metal Exposition

Success of the Ninth Western Metal Exposition, which was held March 28 to April 1 in Pan-Pacific Auditorium, Los Angeles, was attested to by its attendance of 53,639 persons, who saw booths of 360 exhibitors.

The exposition, as well as the Western Metal Congress, will be restaged in Los Angeles on March 25 to 29, 1957.

Sessions of the congress—held in the Ambassador Hotel—were better attended than ever before. Meeting rooms frequently were filled to capacity. The technical programs were attuned to metal production in the western states and received a wide response.

In addition to the American Welding Society, four organizations presented programs. They were the American Society for Metals, Society for Nondestructive Testing, Industrial Heating Equipment Association and Los Angeles Chapter of the American Foundrymen's Society. A total of 23 technical societies cooperated in holding both the exposition and congress.

Solar develops method for fusion welding of titanium

The Solar Aircraft Co. plant at Des Moines, Iowa, has recently developed a technique for the fusion welding of titanium.

Fusion welding of titanium is usually done in a "controlled atmosphere." That is, where the air is kept away from the weld, and the work is bathed with an inert gas. This process reduces chances of making the weld brittle.

In welding sizeable titanium aircraft components, a gas-tight zippered plastic tent is fastened to a standard welding table. The operator wears long-sleeved rubber gloves, sealed to the vinyl bag. Inside the plastic tent the atmosphere can be controlled for perfect welds.

* * *

Large advance registration for AWS spring meeting

Large advance registration indicates a new attendance record will be set at the forthcoming American Welding Society national spring meeting in Kansas City, June 7 to 10.

The meeting, which will be held at the Hotel Muehlebach, will run concurrently with the welding show at the Auditorium. The show will feature the greatest assemblage of welding equipment and accessories ever gathered under one roof.

Outstanding features include the annual meeting of the society; a National Sustaining Member Luncheon; a society banquet at which a nationally-prominent person will speak; a president's reception and a barbeque for society members and their guests.

NEWS

from page 5

DISPLAYS attracted 792 persons at recent Red Arrow welding clinic

DECK-edge elevator for aircraft carrier is all-aluminum, all-welded

Red Arrow Sales Corp. clinic attracts 792

Red Arrow Sales Corp. of Madison, Wis., held a clinic on Feb. 25 and 26 with 792 people attending. Included among the suppliers who took part were Linde Air Products Co., Harnischfeger Corp., Jackson Products, Aladdin Rod & Flux Mfg. Co., All-State Welding, United Wire, Wagner Mfg. Co., Stoody Co., Arcair Co., Ampco Metals, The Lincoln Electric Co., Smith Welding Equipment, Behr Manning, Bay State Abrasive Products, Ramset Fasteners, Gates Rubber Co., Thor Power Tool Co. and Quaker Rubber Co.

* * *

Welding firm sponsors clinic and school

The W. C. DeLille Co. of Zanesville, Ohio, has recently started a welding clinic and a welding school.

The idea of the clinic is to offer first hand information on new equipment and methods in the welding field. Interested persons are contacted before each meeting is held.

The school will teach anyone how to weld for a small tuition fee or free if they buy a welding machine. The entire course can be completed in three weeks by going two nights a week.

* * *

AWS Section to sponsor arc welding symposium

Saginaw Valley Section of the American Welding Society will sponsor an automatic arc welding symposium on May 12, at Flint, Mich. This conference will cover both the submerged-arc and the inert-gas processes.

The morning and afternoon technical sessions will be held in The Hotel Durant ballroom. The General Motors Institute will house the evening dinner and equipment demonstration. The live demonstration of automatic welding equipment will be tied in with the technical papers.

* * *

New welding supply firm established in Michigan

A new welding supply house for welding gases and supplies has recently been established at 812 E. Alcott St. in Kalamazoo, Mich. Acme Welding Supply, Inc., was formed by Ben Burns and Bill McClellan. The firm will operate as an authorized dealer for Air Reduction Sales Co.

* * *

Automatic welding machine is named the "octopus"

An automatic welding machine that has recently been put into operation at the Irving Subway Grating Co., Long Island, N. Y., has been named the "mechanical octopus." It does the work of dozens of human weldors in a single stroke.

The welder resembles its namesake because of the numerous tentacle-like, water circulating tubes that extend from its body. It makes 62 simultaneous welds, or a total of 744 per minute. This represents 24 sq ft of welded grating a minute, or about 1,500 sq ft an hour.

A 1,200-kva machine, the "octopus" has its own water tower, with self-circulating system for cooling transformers and conductors. About 400 gal of water per minute are used.

Carrier elevator is all-aluminum, all-welded

A huge deck-edge elevator recently completed by the Puget Sound Naval Shipyard for the Navy's new carrier, the Shangri-La, is said to be the largest all-aluminum, all-welded structure in America.

This 87,000 lb elevator shifts a plane from the flight deck on top of the carrier to the hangar deck below, or vice versa.

These elevators have an equal capacity to the previous ones, yet they are 17 tons lighter.

All of the welding was done by the Mig (metal inert-gas) welding process. The foreman weldor of the job said that high tensile aluminum is faster to weld than steel.

The all-welded structure is important, according to engineers H. P. Halvorsen and Tom Wyatt, because it shows that the toughest problem of shrinkage and alignment can be solved.

As many as nine pieces of tubing were welded together at a single point.

—Courtesy Reynolds Metals Co.

* * *

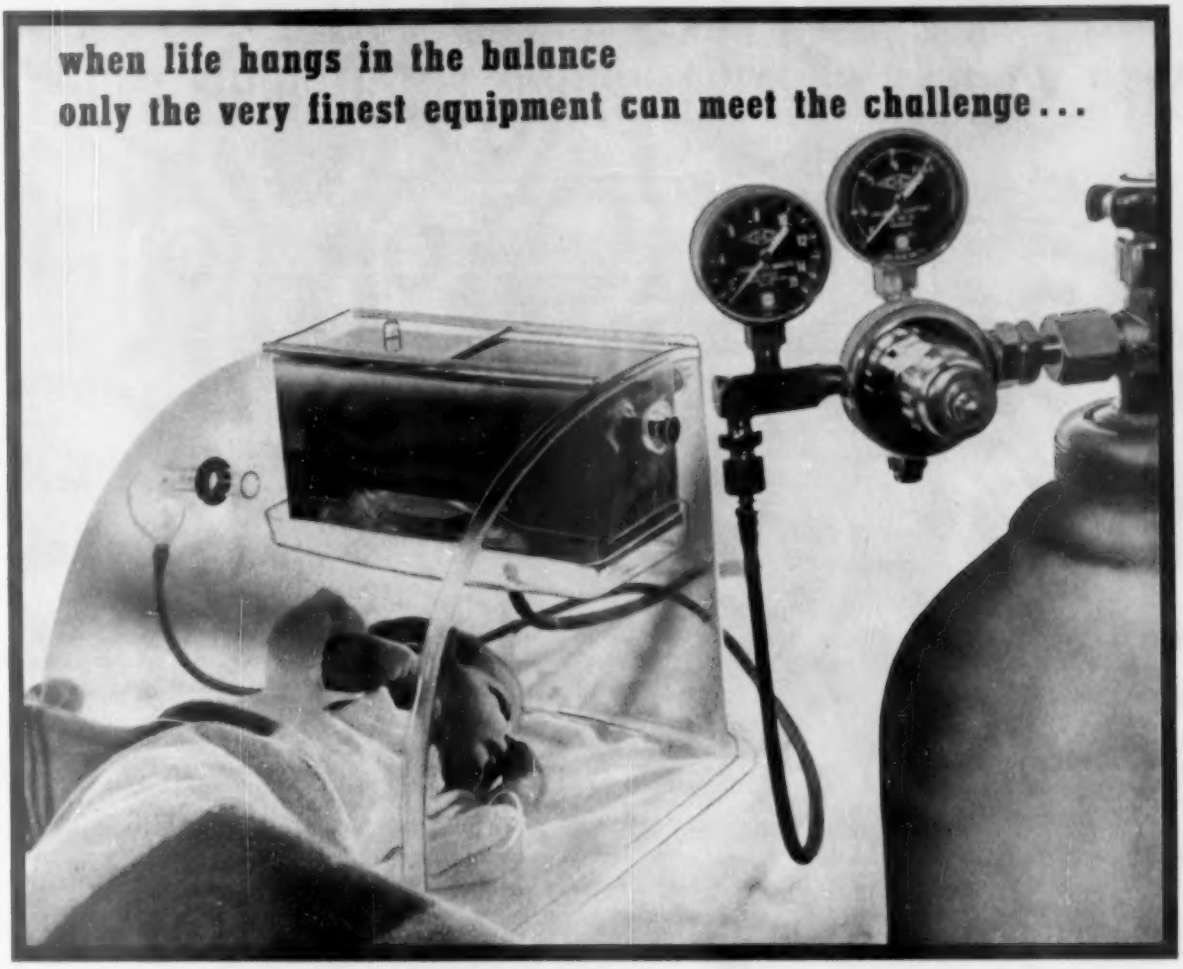
Canadian Trade Fair to feature welding section

Due to the growing importance of welding in many industries, the Canadian International Trade Fair, to be held from May 30 to June 10 at Toronto, will feature a welding and metals section.

This newly-organized section will be one of 23 trade classifications, each of which will contain a selection of products from many countries. At last count over 25 countries were to

(Continued on page 84)

when life hangs in the balance
only the very finest equipment can meet the challenge...



The famous Hudson Plastic Infant Tent for oxygen and Aerosol treatment is one example of 32 Hudson oxygen therapy units . . . and since only the best equipment serves safely and well, NATIONAL regulators are important component parts.

Hudson Oxygen Therapy Sales Co. of 2801 Hyperion Avenue, Los Angeles, California, are manufacturers of a multitude of oxygen therapy units all engaged to alleviate human suffering and to save life. Our company is indeed proud that both its single and its two-stage reduction regulators are component parts of such vital and outstanding equipment. When the leading manufacturers of hospital—of life saving equipment—from Coast to Coast—select the products of NATIONAL of California as component parts, it will give great confidence to every other user of regulators made by NATIONAL of California.

Whether you employ high pressure cylinder gases on cylinder manifolds, in hospital rooms, for scientific laboratory work, for welding or flame cutting, you may not buy finer pressure reducing regulators regardless of cost.

we cordially invite you to write today—for free copy of a beautifully illustrated, 44 page, regulator brochure.

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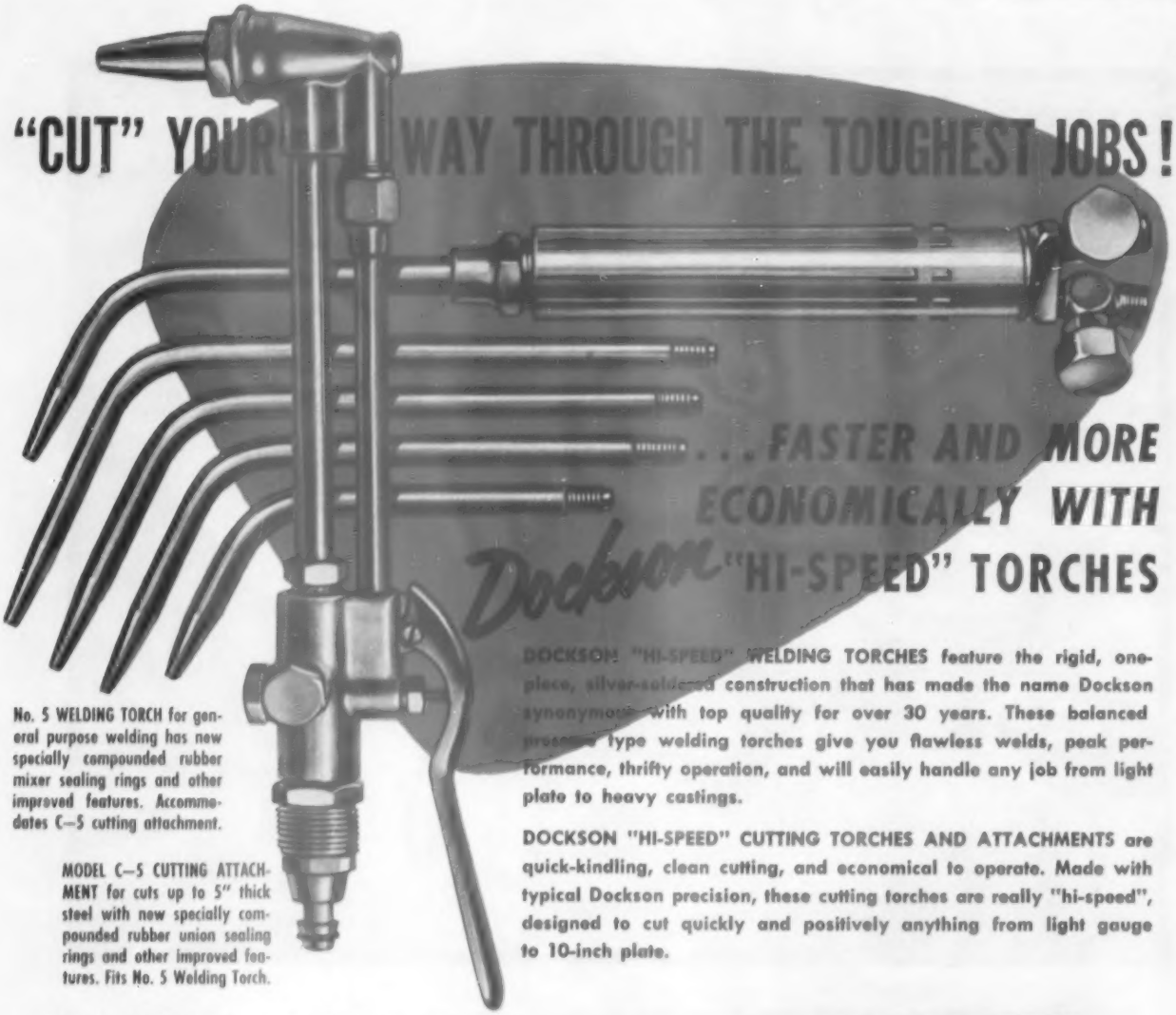

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DOCKSON "HI-SPEED" CUTTING TORCHES AND ATTACHMENTS are quick-kindling, clean cutting, and economical to operate. Made with typical Dockson precision, these cutting torches are really "hi-speed", designed to cut quickly and positively anything from light gauge to 10-inch plate.

No. 5 WELDING TORCH for general purpose welding has new specially compounded rubber mixer sealing rings and other improved features. Accommodates C–5 cutting attachment.

MODEL C–5 CUTTING ATTACHMENT for cuts up to 5" thick steel with new specially compounded rubber union sealing rings and other improved features. Fits No. 5 Welding Torch.

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—Dockson "Hi-Speed" Torches will deliver greater efficiency and longer life on ALL your production and maintenance jobs.

MODEL G CUTTING TORCH for all purpose cutting. Center lever.

MODEL CM CUTTING TORCH —a low cost, compact, balanced—pressure torch for general purpose use.

MODEL D CUTTING TORCH for light gauge to 10" steel plate.

No. 7 S–C WELDING TORCH for small and medium production jobs . . . . accommodates C–7 cutting attachment.

No. 8–E WELDING TORCH for production welding.

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Sizes up to 625 amps. All connectable to 220 or 440 volts—550 volts on request.

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Capacities from 2500 to 36,000 lbs. — remote-control and hand-operated models.

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The first machine to give you either AC or DC current at the flip of a switch.

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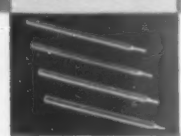


ELECTRODES
For mild steel, cast iron, "hard-to-weld" steels, stainless steels, hard surfacing.

Welding wear plates to trucks at Pullman-Standard's Michigan City, Indiana, plant.

P & H low-hydrogen electrodes out-perform rod costing 5 times as much

...like Pullman Standard, you can save money with them, too

JOINING spring-steel wear plates to freight-car truck frames calls for welding that can really take it. And Pullman-Standard uses nothing less than the finest weld rod it can find for this purpose. That's why more than 50,000 of its modern PS-1 cars have this vital point welded with P&H low-hydrogen electrodes.

Pullman formerly used expensive stainless-steel-nickel rod to assure top-grade welds. But here's what a company report says: "At first we couldn't believe that a rod saving 80% in cost produced much better welds. But our tests showed that P&H low-hydrogen electrodes outperformed stainless-steel-nickel rod costing 5 times as much."

You see, these electrodes are practically hydrogen-free. They eliminate underbead cracking. Little or no preheat is necessary to get high-strength welds with many problem steels. And they cost a whale of a lot less than previously-used stainless rods.

Join "hard-to-weld" steels faster and easier with P&H low-hydrogen electrodes. Ask your P&H representative or distributor about their many advantages or write us. Welding Division, Harnischfeger Corp., 4513 W. National Avenue, Milwaukee 46, Wisconsin.

HARNISCHFEGER

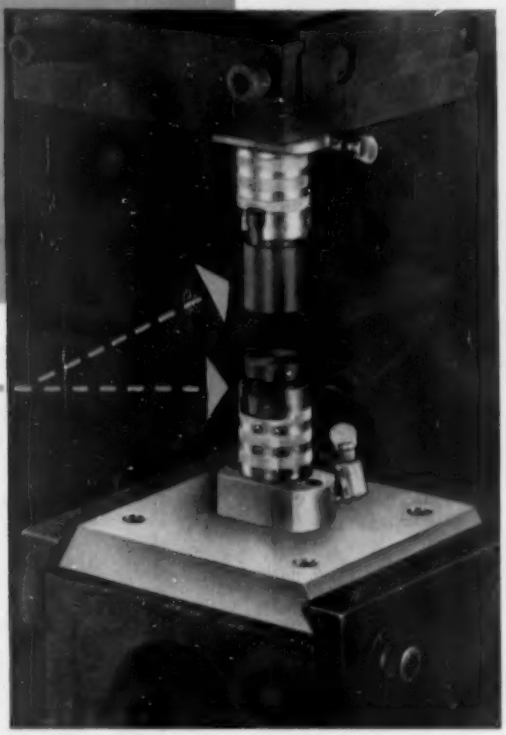
the P&H *Line*

P&H welding equipment is manufactured and sold in Canada by REGENT EQUIPMENT MANUFACTURING COMPANY LTD., 455 King Street West • Toronto, Ontario, Canada

Welding Set-Ups Switched in Seconds

with the

MALLORY "Nu-Twist"® Die Adaptor



PUT this time-saving idea to work in your resistance welding production, and you will eliminate many precious minutes of changeover time.

The Mallory "Nu-Twist" Die Adaptor lets you switch set-ups *in only seconds*. A single die accommodates different electrode inserts. Just turn the adaptor nut, slide out the electrode insert, set in a different one, tighten, and you have a completely new set-up.

Especially valuable for short-run production, "Nu-Twist" gives you practically instantaneous change-overs between projection, spot, mash welding and electrical upsetting. It cuts your inventory, too; all you need is one adaptor and as many different inserts as your production requires.

To fit your welding machine, we supply eight different styles of die adaptor bases, machined to your specifications. Notable among these is the new *Short* "Nu-Twist" Die Adaptor Base, which provides exceptionally small height to go into limited machine space. In addition, our engineers will be glad to design special bases and electrode inserts for your particular requirements.

See your nearby Mallory welding distributor for complete information, or write to Mallory for your copy of our latest Catalog that lists the full line of Mallory resistance welding electrodes, holders, seam welding wheels, forgings and accessories.

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry Street, Toronto 15, Ont.

Expect more... get more from

P. R. MALLORY & CO. Inc.

MALLORY

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STOCK ELECTRODES

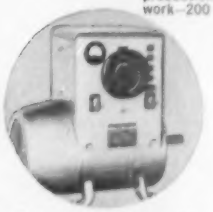
Hundreds of shapes and sizes are available in stock . . . with round water holes or the exclusive Mallory fluted cooling hole for longer life between dressings. Save you both cost and delivery time.

STANDARD ELECTRODES

Odd-shaped electrodes you consider "specials" may well be standard items for Mallory . . . can be made quickly with existing tools, in a wide range of single-bend, double-bend and irregular shapes.

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

ELECTRIC DRIVE DC WELDER for production and general shop work—200 to 600 amperes.

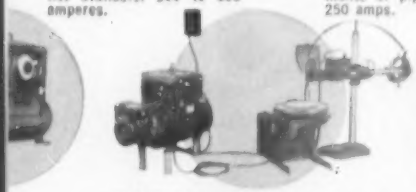


AC POWER—AC WELDER generator only 200 or 300 amps. for welding or 110/220 volts emergency power.

POWROMATIC controls arc voltage independently of current for automatic welding.

GAS ENGINE DRIVE for field use where electric power is not available. 300 to 600 amperes.

"PIPELINER" specially designed to meet the requirements of pipeline welding. 250 amps.



AUTOMATIC HEADS with simplified controls improve automatic welding results without costly maintenance problems.

WATER-COOLED AC POWER AC WELDER 200 or 300 amp. 5 KW or 8 KW for extra heavy duty operations.

DC WELDER AND AC AUXILIARY POWER give you 12 KW AC power for operating motors, tools, lights, etc.

DIESEL ENGINE DRIVE 300 or 400 amp. for use where gasoline is hard to obtain.

AC WELDER—AC POWER. 250 amp. welding—2 KW power. Air cooled.

"BANTAM CHAMP" 250 amp. electric drive welder for light and medium requirements.

"BUILD YOUR OWN" 200 or 300 amp. welder—couple to your own engine.

TRANSFORMER WELDER 180 to 500 amp. AC for shops that have only single phase power.

RECTIFIER 300 amp. DC welder.

"HUSKY BOY" 200 amp. DC air-cooled gas engine drive welder for use in or out of your shop.

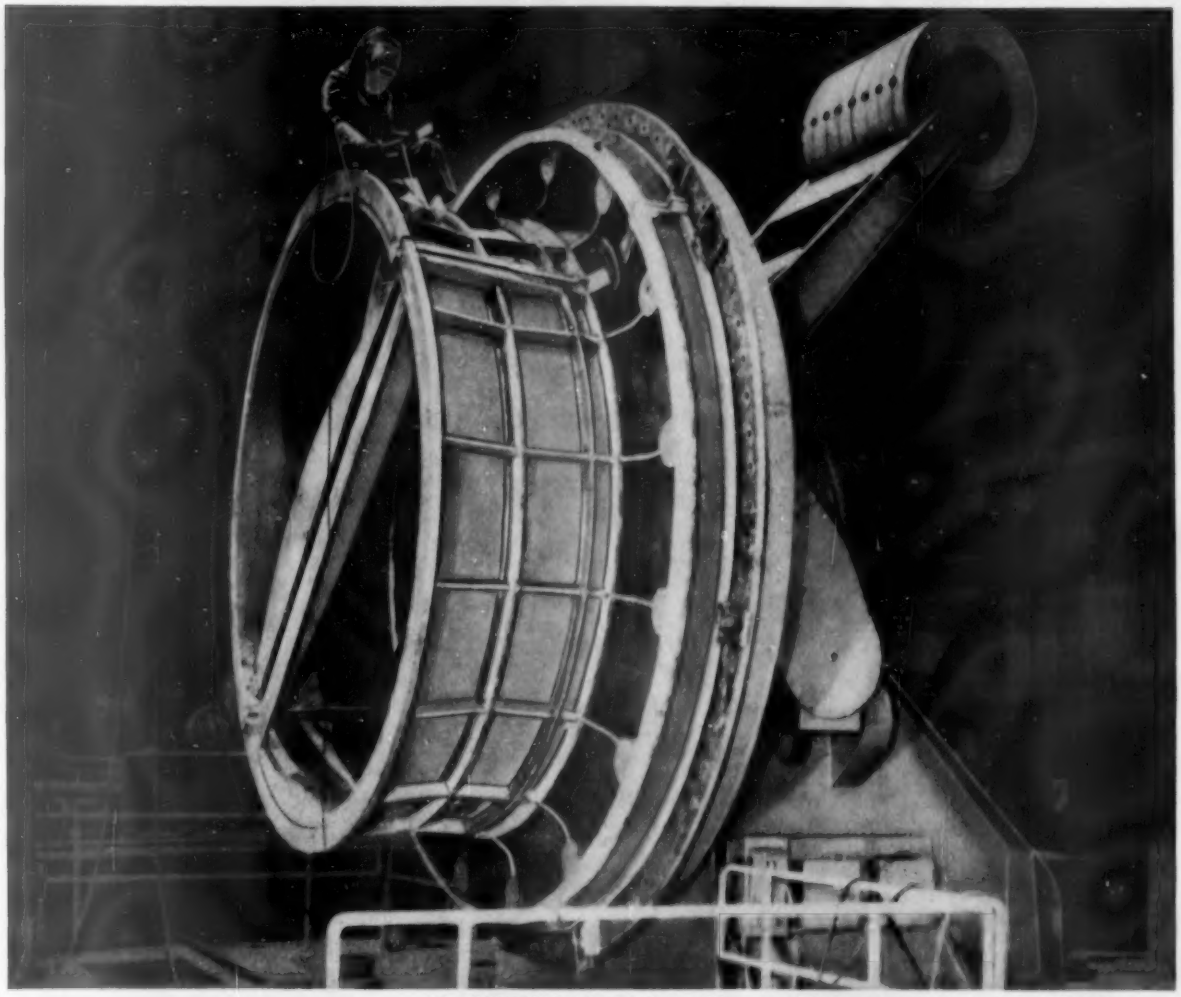
A Hobart Welder
is a sure way to greater welding profits!

Check any point on a Hobart and you'll find quality materials and workmanship. A Hobart will help your weldors put out more work with fewer rejects and less effort. Even the toughest jobs are less costly and are completed faster when done with a Hobart multi-range arc welder. The reason? A Hobart welder gives you constant top performance, cooler operation, easier arc control and extra capacity—they're never skimped of quality materials or workmanship.

Put a check mark on the welder illustrated on this page that best suits your welding needs and mail the page to The Hobart Brothers Company for more complete details.

HOBART BROTHERS COMPANY, Box U-552, Troy, Ohio, U.S.A.

Phone 21223 —"One of the world's largest builders of arc welders and electrodes"



DOWNHAND WELDING of huge weldments at the S. Morgan Smith Co. is made easy by automatic Worthington welding positioner.

World's largest welding positioner

DROP IN AND SEE US AT THE WELDING SHOW, KANSAS CITY, MO., JUNE 8-10, BOOTHS 236-7-8

Handling 64,000-lb weldments was the problem facing engineers in the S. Morgan Smith Company plant in York, Pa.

Correct positioning of pieces this big would be exceptionally expensive if ordinary methods were used.

So this leading turbine manufacturer turned to Worthington for help — and got the world's largest welding positioner.

The extra capacity of this Worthington Model 600 Positioner (it's designed for loads up to 50 tons) is matched by many other Worthington "extras". Worthington's top-notch field service and creative engineering background are more reasons why the *important* positioning jobs — large and small — go to Worthington.

Write for Bulletin R1700S11 today. Worthington Corporation, Positioning Equipment Division, Harrison, N.J. Y.5.1

WORTHINGTON

Welding Positioners • Turning Rolls

NEW NCG® SUREWELD®
IRON POWDER
ELECTRODES

DO YOU USE E-6012 OR E-6020 FOR FILLET, LAP OR FLAT BEVEL WELDING?

A. Length (12.3") of ¼" fillet weld deposited by 3/16" Sureweld "24" electrode in one minute.

B. Length (9.8") of ¼" fillet weld deposited by next larger size—¼"—E-6012 electrode in one minute.

Typical cross-sections of welds made (A) by ¼" E-6012 electrode and (B) by 3/16" Sureweld "24" electrode. Note in (B) the smooth flat profile, the absence of undercutting and the deep penetration obtained with Sureweld "24".

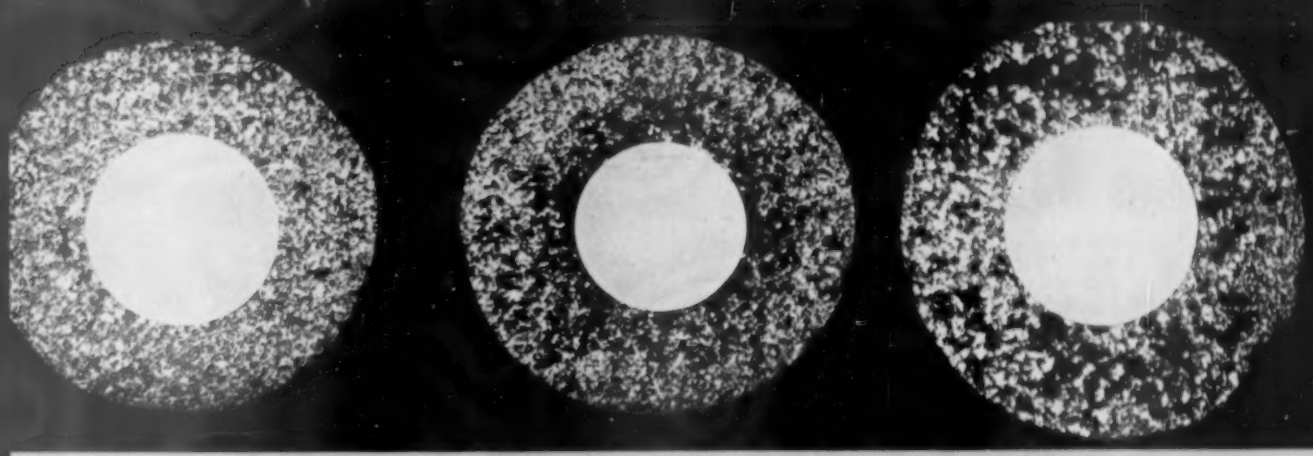
These new electrodes can boost your production welding, reduce your welding costs, give you better quality welds

Tests made under normal shop conditions show that the new *Sureweld* iron powder electrodes can lay down 25% more metal in a given time than E-6012 or E-6020. This is not only because of their faster burn-off rate but because of their higher efficiency. In making the tests, a 3/16" *Sureweld* "24" electrode was used as against *the next size larger*, E-6012. The 3/16" *Sureweld* rod produced 12.29 inches of fillet weld in one minute as against 9.78 inches for the ¼" E-6012. Cost per one foot of weld was $0.0756 for *Sureweld* "24". Cost per one foot of weld was $0.0818 for E-6012. These cost figures do not include savings from the use of lower amperages nor the savings from easier clean up, less grinding and finishing and the almost total elimination of undercutting.

Sureweld iron powder electrodes also produce *better welds* —with higher impact values and greater crack resistance, deeper penetration and remarkable freedom from porosity.

Two types of these new electrodes are available: *Sureweld* "24" (E-6024) for production welding applications in which E-6012 is now used; and *Sureweld* "27" (E-6027) for E-6020 applications.

Write—for new descriptive bulletin for a free demonstration or buy and try Sureweld Iron Powder Electrodes yourself at your authorized NCG dealer or NCG office

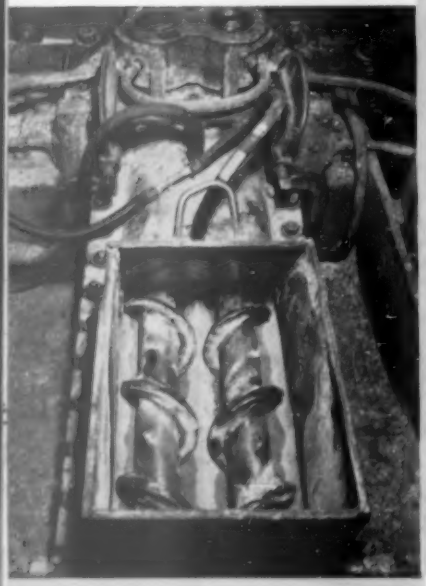


Cross-section of Sureweld "24" electrode. Note the even distribution of iron particles and other coating constituents.

Cross-section of a well known brand of iron powder electrode. Compare the uniformity with that of the Sureweld electrode.

Cross-section of still another well known brand of iron powder electrode.

DO YOU USE IRON POWDER ELECTRODES NOW?



These macrophotographs reveal facts vital to your welding profits

The one chief reason for using iron powder electrodes is to increase welding production and profits. But your success in the use of iron powder electrodes depends principally on how uniformly the iron powder particles and other ingredients are mixed in the coating. When the ingredients are mixed evenly, burn-off proceeds uniformly, evenly and swiftly; and you get maximum welding production.*

The macrophotographs shown above have been made by an independent and impartial testing laboratory of random cross-sections of a *Sureweld* iron powder electrode and two other well-known brands of iron powder electrodes. These magnified cross-sections reveal the distribution of iron powder particles and other constituents in the coating of the three brands of electrodes mentioned.

***NOTE: The welding process is a form of partial combustion. As in the case of all combustion, any man who has ever built a fire knows that "fuel" elements must be evenly distributed if the fire is to burn well and rapidly. But if there is uneven distribution and "dead" spots you have trouble getting the fire started and keeping it going. This is true of coated electrodes as well, especially those with powdered iron added to the coatings.**

Why Sureweld iron powder electrodes always possess complete uniformity

Efficient iron powder electrodes don't just happen. They are carefully planned and carefully made. NCG selects coating ingredients carefully and mixes them carefully. And instead of the conventional hydraulic extrusion equipment which exerts heavy pressure on the entire mass of flux, NCG uses special gear-type extrusion-coating machine which is shown on this page. Large screws feed the flux into synchronized gears that transfer the flux in small amounts to the extrusion chamber. *And only at the point of actual coating and extrusion is high pressure used, when it is too late to cause segregation of the flux ingredients.* Thus the uniformity arrived at in the flux-mixing machines remains unimpaired.

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EVERYTHING FOR WELDING

NATIONAL CYLINDER GAS COMPANY
840 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS *Branches and Dealers from Coast to Coast*

the GREATEST ADVANCE in cutting machines in years

DOES THE WORK OF LARGER...HEAVIER...MORE COSTLY EQUIPMENT

EASIER...BETTER...CLEANER...AT LESS COST

Sensational New

BURDOX BEAVER

Portable Cutting Machine

MOST POWERFUL . . . MOST EFFICIENT CUTTING MACHINE IN ITS SIZE
CUTS UP TO 4" WITH EASE

STRAIGHT LINE CUTTING using rigid rail to support grooved roller guide wheels.
BEVEL CUTTING is done in same manner with torch set at angle . . . from plus or minus 45°.

CIRCLE CUTTING using radius rod with adjustable compass point centering on any center from 13/16" to 32".
SHAPE CUTTING by manually guiding the machine along any desired shape.

Almost anyone can operate the BURDOX BEAVER because of its simplicity. Just set the speed and gas controls, light the torch and you'll get smooth cuts in a straight line, circles or shapes almost like magic. The entire machine weighs only 16 pounds, making it easy to handle on any cutting operation. Economical to use on special jobs or production runs. Cuts metal from ⅛" to 4" in thickness.

The BURDOX BEAVER is the only practical portable cutting machine on the market today equal in performance to larger, heavier more expensive equipment. Its low cost, its amazing performance features and trouble-free operation make it ideal for any size or type of plant. You save time, you'll save money and do far better cutting jobs with the BURDOX BEAVER all year long. Write for further information today. Use coupon below!

Every Product . . . every Process to fit every Purpose Best!

ARC WELDING EQUIPMENT

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Please send information on Beaver Cutting Machine

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Quality...
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Victor presents . . . **8 completely new cutting torches**

Models ST-1000, ST-1100, ST-1200 and ST-1300 Hand Cutting Torches . . . Model CA-1050 Hand Cutting Attachment . . . and Models MT-200 and MT-300 Machine Cutting Torches.

These completely new designs feature modern-clean-streamlined-sturdy lines . . . stainless steel preheat gas mixing chambers . . . heads of forged Everdur bronze or Monel . . . valve bodies and "Y's" solid die forged brass . . . hand-fitting oval shaped fluted brass handles . . . choice of cutting oxygen lever in four locations, top and bottom, front and back.

VICTOR Quality Cutting Torches will do a better job and stay on it under all kinds of difficult cutting operations.

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VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings.

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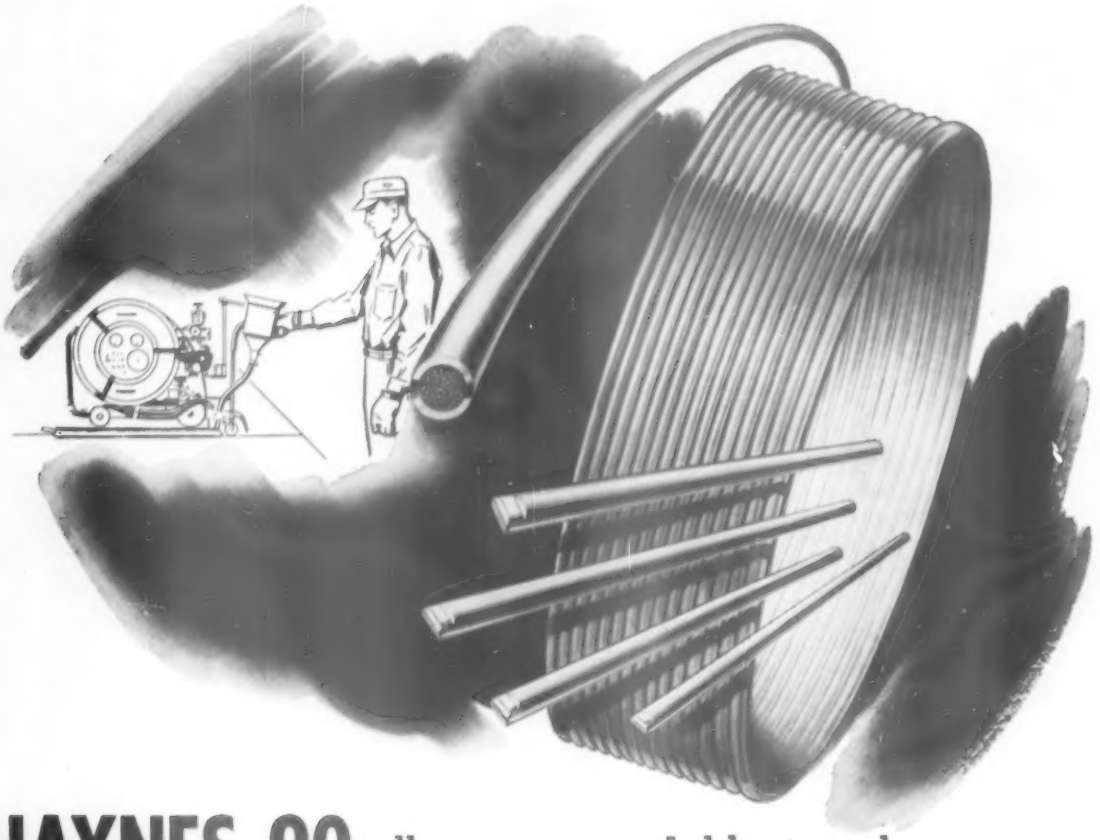

HAYNES 90 alloy now available in tubes and at a MUCH LOWER PRICE

TRADE-MARK

Now you can save even more by hard-facing wearing-parts with HAYNES 90 alloy. This is because HAYNES 90 costs so much less in this new economical tube form. These new tube rods produce sound, uniform deposits that won't crumble or flake off at temperatures up to 1000°F. They provide the same high abrasion, impact, and corrosion resistance—the same dependable protection for your equipment that HAYNES 90 brought to you as a cast rod—and at a much lower price.

For manual hard-facing, HAYNES 90 tube rod comes in convenient 14-in. lengths for easy application with standard metallic-arc welding equipment. For rapid coating of large parts, HAYNES 90 also comes in coils for mechanized hard-facing by the submerged-arc, inert gas, and open-arc methods.

HAYNES 93, HASCROME, and HAYSTELLITE alloys are also available in this economical tube rod form. HAYNES 93 iron-base rod is noted for high abrasion and corrosion resistance . . . HASCROME iron-base rod for high impact resistance . . . and HAYSTELLITE tungsten carbide rod is tops for resistance to severe abrasion.

For more information about these new, inexpensive tube rods and coils, along with other HAYNES long-wearing hard-facing products, contact your nearest Haynes Stellite Company office today.

"Haynes," "Hascrome," and "Haystellite," are registered trade-marks of Union Carbide and Carbon Corporation.

HAYNES TRADE-MARK ALLOYS

HAYNES STELLITE COMPANY

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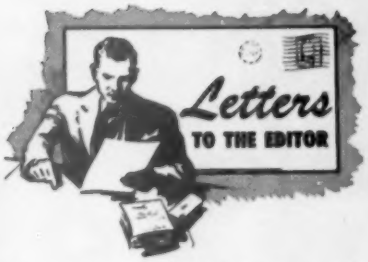

Letters should be addressed to: The Editor, WELDING ENGINEER, 12 E. Grand Ave., Chicago 11, Ill. No letter will be published unless signed, but your name will be withheld if you request.

Reprints requested

Dear Sir:

The article in the February issue of WELDING ENGINEER on "Three ways to cut costs of production weldments" was of great interest to us. Would it be possible to receive about five or six reprints of this article for distribution among some of our design engineers?

Also, do you have a reprint of the article that appeared in the December issue on "How design control can save you money"?

Very truly yours,
Stanley Warner
Supervising Engineer
Trackson Co.
Milwaukee

—Tear sheets of both articles have been sent to Mr. Warner.

* * *

Interesting editorial

Dear Sir:

As usual, your March editorial, "Welding and wonders of the U. S.," was very much to the point and most interesting. Wouldn't most of us settle for 1954 years during the balance of our business careers?

Sincerely,
R. C. Waldie
Vice-president—sales
Williams and Co., Inc.
Pittsburgh

* * *

More congratulations

Dear Sir:

Upon my return to Hinsdale, I learned of your recent acquisition of our mutually favorite welding magazine.

While you probably know best the broadened responsibilities which this independent ownership involves, the entire welding fraternity will most

(Continued on page 65)

8 reasons why you should specify

NORRIS-THERMADOR
ACETYLENE CYLINDERS

Getting full measure from each and every cylinder on the job is more than convenient. It's a must! Without it, cost of operation goes up, margin of profit comes down.

1. Norris-Thermador acetylene cylinders offer more than guaranteed full measure, take a uniform charge.
2. Exclusive Monolithic Filler, tight within the cylinder shell, extra safety.
3. Shaped by the famous Norris cold drawing process, the shoulder is thicker, stronger.
4. Light weight by comparison, Norris cylinders provide smoother sides, more uniform wall thickness, better appearance.
5. All welding is X-ray controlled and Specification ICC 8 is met or exceeded.
6. Cylinder base is curled under for permanency, strength. You save because there is no rolling ring to loosen or dent.
7. More units can be stacked in storage or in transit.
8. Even the hole in the cap is made conveniently larger so that the tag can be easily read without removing the cap.

With Norris-Thermador's vast plant in the deep-water port of Los Angeles, you save on overland freight.
Acetylene cylinders from 10 to 300 cubic feet capacity
Write or wire for specifications on all sizes. Cable: Northerm

"SEVEN LEAGUES AHEAD"

3-1011

NORRIS-THERMADOR CORPORATION Dept. WE-555
5215 South Boyle Avenue, Los Angeles 58, California
Please send information on cylinders.

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WELDING ARCS NEWS

COMPLETE G-E LINE OF EQUIPMENT AND ELECTRODES ASSURES YOU UNBIASED APPLICATION HELP

G-E RECTIFIER WELDERS—300 and 400 amps. Because General Electric offers all three—rectifier, a-c, **and** m-g welders, we can impartially help you choose the unit your job needs.

G-E MG WELDERS—200, 300, and 400 amps: provide unique magnetic interactor to minimize popouts and assure a steady, forceful arc.

Tests show how G-E rectifier welders provide a stable, easily handled arc, even on difficult vertical welding

FULL-TIME arc-force control virtually eliminates short-arc sticking

Faster, easier welding and improved arc stability . . . these are two important advantages you get with the new General Electric rectifier welder. And with G-E **full-time** arc-force control, you can match your job with a soft or deep-digging arc . . . at the flick of a switch.

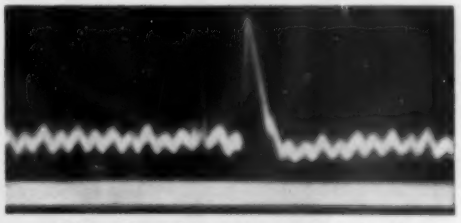
Soft arcs are desirable for many jobs. But short-arc work needs a forceful and deep-penetrating arc.

WHY YOU NEED arc-force control is shown in G-E laboratory research: As you weld, metal drops pass from the electrode to the work — causing frequent short circuits. Without arc force, the drops cool, and if you are using a short arc—the electrode will likely freeze to the job.

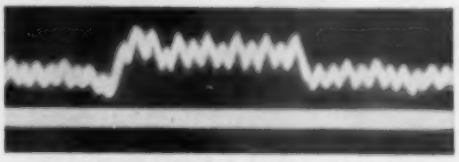
OSCILLOGRAPHIC PROOF (next column) shows how G-E arc-force control provides a powerful, split-second surge of current to blast the metal drops away—allowing you to bear down on the arc. Without arc force (lower graph), short circuits are long and at low amperage. The drops cool, causing sticking in short-arc welding.

CONTINUOUS OPERATION is an exclusive feature of G-E arc-force control. Since the capacitor design is self-protecting, there is no thermostat to cut out the arc force just when you need it most. G-E **full-time** arc-force is always ready to stabilize the arc and give deep penetration.

OTHER EXCLUSIVE BENEFITS of G-E rectifier welders are: combination cleaning-cooling fan; special coil mounting, which reduces wear, noise; and easily removable side covers. The efficient moving-coil design is used. Send coupon for free book. YOUR LOCAL G-E WELDING DISTRIBUTOR IS LISTED IN YOUR PHONE BOOK UNDER "WELDING EQUIPMENT, GENERAL ELECTRIC COMPANY."



G-E arc-force blasts away short circuit



Lengthy short circuit without arc force

G-E AC WELDERS—295, 300, 400, and 500 amps: offer efficient moving-coil design; fine accuracy of current settings; simple rugged construction.

FREE SELECTOR CHART (send coupon) gives you a handy reference on full electrode application data. Complete G-E electrode line features balanced design—for best over-all results.

Section B711-1, General Electric Co., Schenectady, New York.

Please send me the bulletins checked below:

- ☐ GEA-6242, G-E Rectifier Welders
- ☐ GEA-6243, G-E AC Welders
- ☐ GEC-664, G-E MG Welders
- ☐ GEC-657, Electrode Selector Chart

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You'll want to see—

the latest in...

HELIARC WELDING
SIGMA WELDING
UNIONMELT WELDING
AUTOMATIC TRACER-GUIDED MACHINE CUTTING

Visit the LINDE *display at the 1955 Welding and Allied Industry Exposition in Kansas City, Missouri, June 8, 9, and 10*

Whether your fabricating needs are for a small shop or for huge production lines—on carbon steel, complex alloys, or non-ferrous materials — LINDE has a high-speed, cost-saving electric welding process for every job . . . And if your problem is precision cutting of sheet or plate materials, straight lines or intricate shapes — LINDE oxy-acetylene cutting machines may be the answer. See them — find out about them — LINDE *representatives* will be glad to answer your questions and demonstrate or explain the finest in high-speed, low-cost metal fabricating and cutting.

Be sure to see all demonstrations—straight polarity sigma welding of carbon steel plate, HELIARC welding of pipe, and shape-cutting with an automatic tracer.

To find out how you can increase production and cut costs, make a note to visit the LINDE display — space number 218.

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

The terms "Linde," "Heliarc," and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

Linde
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Eye Protection

Fits Over Practically All Personal Glasses— Comfortably!

For welders who wear prescription glasses, the new AO 625 Headrest Goggle has what it takes in comfort, convenience, and protection against dangerous light radiations, glare, flying sparks and scale. Perfectly balanced, there is no overhanging weight — even in "off-guard" position. NOTE THE NEW "327A" LARGE COVERGLAS DESIGN WHICH GIVES UP TO 20% MORE ALL AROUND VISION THAN COMPARABLE GOGGLES. Your nearest AO Safety Products Representative can supply you.

Quick Facts

- Thumb screws permit quick adjustment to facial contours and proper pupillary distance. Spring mechanism throws goggle into "off-guard" instantly.
- Fibre headgear fits snugly. Adjusted by nut turning on right and left hand threaded stud.
- Opaque eyecups fit closely, won't conduct heat. Especially designed for wear over personal glasses.
- Side shields are light-tight, provide indirect ventilation.
- Noviweld or Filterweld lenses, shades 3, 4, 5, 6, or 8. Easily replaceable cover lenses protect filter lenses from pitting or scratching. Please specify type of lens and shade number desired.

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ACCO products

3 Big Reasons for Buying PAGE Automatic Welding Wire

1. Packaged to fit your particular requirements

2. A wide range of analyses to fit a particular job

3. Greatest convenience — you can buy from local stocks

There is every reason why you should look to PAGE for your automatic welding wire needs. For PAGE not only manufactures wire in an extremely wide range of analyses, but packages them in a variety of ways for the most complete protection and convenience in handling and stocking. PAGE Distributors throughout the country carry stocks — this means savings for you, in ordering time and in inventory investment.

Shown above are some of the handy ways PAGE Automatic Welding Wire is packaged...There are lightweight, durable Leverpaks, which provide perfect protection against coil distortion or wire corrosion. They're easily opened and resealed, roll easily, stack perfectly and take a minimum of floor space.

There are single and pallet-mounted (1,000 lb., 2,000 lb., 3,000 lb.) coils, each wrapped in waterproofed paper and held secure by steel strapping; thread-wound, 25-pound reels to fit popular machines; also, coils in individual cardboard cartons, available singly or palletized for handling by fork-lift truck.

Page Offers 26 Analyses in Automatic Welding Wire

In order to provide you with *exactly* the correct automatic welding wire for your specific requirements—no matter how "special" or "different" they may be—PAGE offers no less than 26 different analyses from which to choose. These "cover the waterfront" of applications: heavy automatic submerged arc...light manual submerged arc ...inert gas manual and automatic, tungsten or metal arc.

Carbon Steel • Any carbon from Armco (.025 max.) to high carbon (.90—1.10). All standard AISI analyses in between.

Low Alloys • All the most popular welding grades

Stainless • AISI grade. Other types on request

Following is a list of the *26 analyses* in which PAGE Automatic Welding Wire is readily available:

Page A-S-Armco	Page A-S-110	Page NAX-9115
Page A-S-6	Page A-S-15	Page-Allegheny A-S-Type 304
Page A-S-10	Page A-S-15-MO	Page-Allegheny A-S-Type 308
Page A-S-17	Page A-S-3½-Nickel	Page-Allegheny A-S-Type 308 ELC
Page A-S-20	Page A-S-6150	Page-Allegheny A-S-Type 309
Page A-S-65	Page A-S-4130	Page-Allegheny A-S-Type 310
		Page-Allegheny A-S-Type 316
		Page-Allegheny A-S-Type 316 ELC
		Page-Allegheny A-S-Type 347
		Page-Allegheny A-S-Type 348
		Page-Allegheny A-S-Type 410
		Page-Allegheny A-S-Type 420
		Page-Allegheny A-S-Type 430
		Page-Allegheny A-S-Type 502

Details of all these analyses are contained in our new Folder DH-402. Write for it!

from Page's Wide Range You Can Get Exactly the Analysis You Need for Each Welding Job

• The *right* electrodes and the *right* rods for every welding job! That is what you must have for perfect operation—and that is what you can expect from the wide range offered by PAGE. Choose what you need from this complete line:

Gas Welding Rods

Armco Gas (GB-45)	Page Armco
Mild Steel (GA-50)	C Gas
Low Alloy (GA & GB-60)	Hi-Tensile M
3½% Nickel (GB-65)	3½% Nickel
.55—.65 Carbon	Medium Carbon
.90—1.10 Carbon	High Carbon
Manganese Bronze	Manganese Bronze
Naval Bronze	Naval Bronze
Stainless Steel	According to AWS analysis

Any Page A-S Automatic Grade in 36" Lengths

Bare Electrodes

Armco	Page Armco
Low Carbon	Page "CE"
.13—.18 Carbon	Page "B"
.55—.65 Carbon	Medium Carbon
.90—1.10 Carbon	High Carbon

Metal Spray Wire

Armco	Page Armco
.10 Carbon	#10
.28 Carbon	#25
.40 Carbon	#40
.60 Carbon	#60
.80 Carbon	#80
1.00 Carbon	#100
3½% Nickel	3½% Nickel
Manganese Bronze	Manganese Bronze
Naval Bronze	Naval Bronze
Stainless Steel Metal Spray	According to AWS Analysis

Convenient Service from Local Stocks

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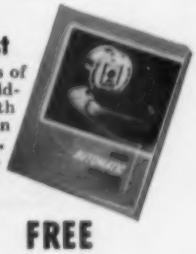
All the 26 analyses of PAGE Automatic Welding Wire are set forth in complete detail in new **Folder DH-402.** A free copy of this informative folder will be sent to you on request. Write to our Monessen, Pa., office.



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Ni-Rod gave this lathe a new lease on life

See the weld in this picture? It joins a steel plate to a cast iron hub. It has been keeping this 20-foot lathe in operation ever since replacement parts were no longer available.

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Success stories like this show how Ni-Rod fills the need for a general purpose electrode for welding cast iron. Even welders of limited experience get sound, machinable welds with Ni-Rod.

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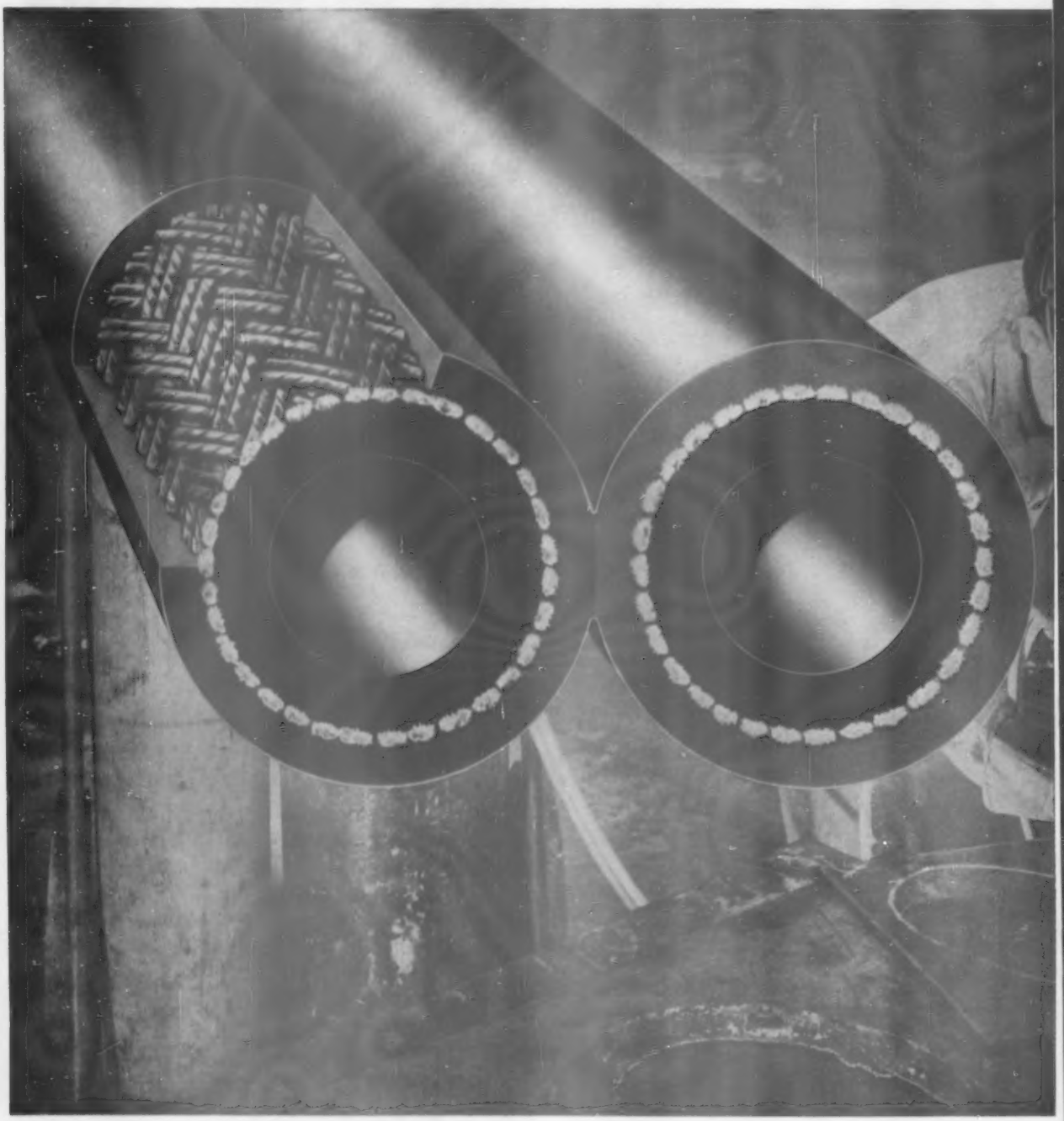

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Hewitt-Robins Twin-Weld—the original Twin-Line Welding Hose—Offers Values Found in No Other Hose... Single or Double Line!

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ENGINEERING DATA

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SIZES: O.D.'s now conform to IAA specifications—7/16", 17/32", 19/32" . . . I.D.'s 3/16", 1/4", 5/16".

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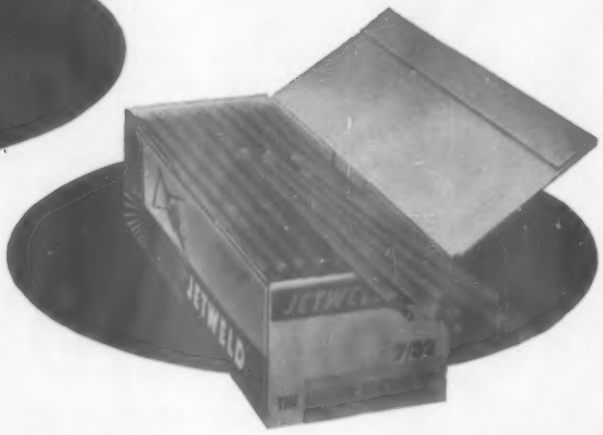

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extra-fast welding
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ESTABLISHED 1916 — Welding Engineer — MAY, 1955

Distributors and price cuts

PRICES of arc-welding electrodes have recently been cut in a few selected areas of the country. This probably means that before too long the cut will be general in nature.

It is regrettable that this price cut was made. If there is too much profit in electrodes (and we don't believe there is), it should have been diverted to research. An additional 1¢ or 5¢ per pound for electrodes would make very little difference in the *overall* cost of a welding job. It would, however, make a difference in the amount of research. And there is still much to be done in developing electrodes.

To date, there has been far too little of such research.

The loudest repercussions from this downward price move will no doubt be heard from the welding distributors, who are meeting in Chicago this month. They will talk about the short discount on electrodes and how it should be raised. There will be talk about the overall welding discount picture and how it should be improved.

On some scores they will be right. Margins have not been sufficient to permit the expected profit in some instances. By the same token, however, there is a lot of house cleaning the welding distributor can do.

Some of the distributors who will be crying the loudest for higher discounts operate the most inefficient businesses. They of course *need* longer discounts because their costs of doing business are higher. But if this type of operator had more money to spend, he would probably spend it just as foolishly and would be no better off in the end.

THE principal argument used by one electrode manufacturer in keeping margin on electrodes low is that "if they (distributors) had more profit to play with, they would try to get business by cutting prices." Unfortunately, that has been the truth in many instances.

The problem of cutting costs is a tough one. Cutting may seem next to impossible because it is felt that operating expenses are already at a minimum. However, we don't believe this true of too many welding distributors. Many of them are still nursing the wartime ideas that "the job is being done on a cost-plus basis" and "Uncle Sam is paying 65c of each dollar." Both thoughts may have been fact at one time, but are they now?

We have been told that the average welding distributor could add another 10% to his overall profit picture if he would just look into his overhead accounts. There may be deadheads riding in the overhead who could easily be eliminated. Actually, it's just a matter of checking to see that your operation is efficient.

IT HAS often been said there is nothing wrong with any business that sales won't cure. This most certainly applies to the business of distributing welding supplies, equipment and accessories.

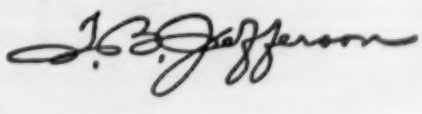
One of the big problems confronting the welding distributor today is the lack of good salesmen. If a sales organization is functioning properly, its staff can bring in a good deal of business in the present market. Of course, many of today's "salesmen" are not accustomed to digging.

Few salesmen seem to realize there are prospects for welding equipment in every plant. Some would be surprised to learn that welding plays an important role in the maintenance of hotels, hospitals, laundries, bakeries and many other operations outside the metalworking field. But how many take time to call on such prospects?

It is sometimes difficult for a good salesman to become a good executive. The two jobs require different types of thinking, and often a good salesman can't adapt himself to problems of the executive. That's why some top-notch salesmen have failed as operators of welding-supply houses. It is they who complain there is not enough profit because of narrow margins, when, in reality, poor management is the reason.

Before complaining about profit margins, why not look over your operation to determine whether there isn't some fat that can be pared? If you are certain the overall margin on a product isn't sufficient to make the sale profitably, don't sell it. Nobody is forcing you to stay in business and lose money. Be sure, though, that the manufacturer can get returns on his product sufficient to include research expense.

It is only through research that welding and industrial America can grow.



The match test dramatizes an idea—same match and same heat can burn the hand or simply warm it, just as your welding torch or arc welder can, in combination with Eutectic "Low Temperature Welding Alloys." Join metals without risk of dangerous overheating, distortion, warping and embrittlement. Write for free booklet "How To Overcome Your Welding Problems." (TIS 2268) Eutectic Welding Alloys Corporation, 40-40 172nd Street, Flushing 58, N. Y.

NWSA meets in Chicago May 18-20

HEADQUARTERS for the convention will be the Edgewater Beach Hotel.

EXPECTED to be the finest in its history, the National Welding Supply Association's 11th annual convention will open on Wednesday, May 18, at Chicago's Edgewater Beach Hotel and continue through Friday, May 20.

President James N. Alcock, Saginaw Welding Supply Co., Saginaw, Mich., and E. C. Caluwaert, convention chairman and NWSA vice-president, O. K. I. Welding Supply Co., Cincinnati, have expressed their conviction that a new attendance record will be set this year.

Invitations have been extended to distributors of welding equipment and supplies from outside the United States and Canada. Mr. Caluwaert feels the annual convention will provide the opportunity for foreign distributors to meet with the various firms they represent and also to acquaint themselves with distributors in this country.

Highlight of the convention will be the banquet and dance Thursday evening, May 19. Dr. John O. Christianson, superintendent of the School of Agriculture, University of Minnesota, Minneapolis, will be the featured speaker at the dinner. He will appear under the sponsorship of General Motors Corp., Detroit.

Board Meeting

Before the convention officially opens, the board of directors will have a morning meeting and luncheon on Tuesday, May 17.

The president's reception will be held at 6 p.m. that same evening. Convention delegates have been urged to arrive in time for this event.

The convention will be officially called to order at 9:30 a.m., Wednesday. Following President Alcock's welcoming address, delegates will hear from Robert C. Fernley, secretary-treasurer of NWSA.

Arthur C. Horrocks, public relations counsel of The Goodyear Tire & Rubber Co., Inc., Akron, Ohio, will speak on "How Big Is Your Field?" "Men Make the Difference" will be the title of a speech by Verne R. Martin, Newton, Iowa. Dr. Robert N. McMurry, McMurry, Hamstra & Co., Chicago, will talk on, "Selecting Salesmen Who Can Sell." Glenn G. Garman, Purity Cylinder Gases, Inc., Grand Rapids, Mich., will report on the findings of the manufacturers' relations committee.

This opening session will close for lunch after general announcements and a report from the nominating committee.

At 6 p.m. that evening, associate members will be hosts at a reception.

Thursday morning's meeting will open with a panel discussion on "How to Increase Sales in a Buyers' Market." Cloyd S. Steinmetz, director of sales training, Reynolds Metals Co., Louisville, will follow with a talk on "Creative Salesmanship." As might be gathered, the theme of NWSA's 11th annual convention is "the life of a salesman." The final talk of the day will be the report of the catalog committee, to be given by Chairman William A. Rice, Virginia Welding Supply Co., Charleston, W. Va.

Election and introduction of officers and directors for the coming year will follow.

Contact Booths

NWSA's 6th annual Contact Booth program will be conducted the afternoons of Wednesday and Thursday. A record number of associate members is expected to participate.

A ladies' program has been planned for Wednesday and Thursday mornings. While the business sessions are being conducted, the wives on Wednesday will attend an informal coffee hour, followed by luncheon and a fashion show at Marshall Field & Co. On Thursday morning, they will visit the Helene Rubenstein salon. Luncheon will be at the Kungsholm restaurant.

Wives have also been invited to attend the last business session on Friday morning which will include several talks that should be of interest to them. Among these is one by Phyllis Brown, The Research Institute of America, Inc., New York City, on "The Salesman's Wife."

The rest of Friday's agenda: A. C. Van Dusen, vice-president and director of public relations at Northwestern University, Evanston, Ill., will speak on "How to Use Psychology in Selling." Fred Smith, vice-president —operations, The Gruen Watch Co., Cincinnati, will deliver a talk entitled, "Selling—An Interesting Way to Live." Leslie P. Beaver, Jr., national chairman of the membership committee, Beaver Welding Supply Co., Memphis, will present the report of his committee.

Following this will be reports by the treasurer and the resolutions committee. The new officers will then be installed.

Delivery trucks - - To lease or

The case for leasing . . .

FOR welding-supply distributors, all of whom are engaged in some form of trucking, the controversy between ownership and leasing is an important one.

Everyone is concerned with getting the most from his operations. To get the most, you often need the help of others to overcome certain difficulties. This help is normally sought from a specialist.

Therefore, if you use trucking in some part of your operations, you would consult an expert in that field. If you own your own trucks, you are in the trucking business yourself.

Operating trucks would just be a sideline for you, but for trucking concerns, it's their business. They do nothing else.

Lighter Burden

When you rent trucks, you lessen your administrative burden. Here are seven reasons why leasing proves advantageous:

(1) Capital investment is released for other uses.

(2) Professional mechanical care and maintenance is assured.

(3) The best truck appearance, including attractive lettering and painting to meet your specifications, is also assured.

(4) Truck costs are set in advance, providing cost-accounting accuracy.

(5) Uninterrupted service is guaranteed.

(6) Need for surplus trucks is eliminated.

(7) Truck engineers who design trucks for your precise needs are made available.

Because you won't have to tie up your capital, you won't have to diversify your operations. And, you can deduct the entire expense from your taxes.

Rates Vary

Besides the factors already mentioned, truck leasing doesn't cost more than truck ownership. It is impossible, though, to state exact figures because rates vary depending on the size and type of vehicle required, and the necessary weekly mileage.

The following example will give you some idea of leasing charges: For a 2½-ton truck (with a 12-ft body) operated 300 miles per week, the charge would be about $35 a week plus 10¢ a mile. If the mileage per week were higher, the weekly cost would increase, but the cost per mile would decrease.

The main point to realize here is that, through specialization and volume purchasing, the truck-leasing

The case for owning . . .

BY GLENN G. GARMAN*

DELIVERY economics is a subject that can stand a lot of thought and discussion because for those of us in the cylinder gas business it is the heart of our operations.

Trucks, truck expense, drivers' wages, etc., can be compared to direct machinery and labor costs of a manufacturing plant. They are the basis for all our operations. Some profitable hours can be spent making a thorough review of truck operations.

During the past few years there has been considerable discussion regarding the leasing of trucks.

In my opinion, truck leasing is a pitfall.

Here is an example of a proposal made by a leasing company after a complete review of the trucks involved:

Briefly, it proposed to furnish trucks (without bodies); complete maintenance including body, oil, lubrication, washing, cleaning; taxes on trucks, public liability insurance up to $300,000 and property damage up to $50,000. When a new truck was placed in service, the lessor would mount and paint the body supplied by us.

Already Had Bodies

This arrangement was made because we already had bodies for all our needed equipment. With little work, one body will outlast quite a few trucks.

For comparison purposes I will use a Chevrolet truck we put into service about Jan. 1, 1953, and which the lessor proposed to buy from us at exactly what it cost us—$4,673.82 without the body. The rental on this truck was to be $49.45 per week plus 6¢ per mile. Thus the weekly charge would be $49.45 times 52 weeks or $2,571.40. The 1953 mileage was 22,719; this multiplied by 6¢ was $1,363.14. Total cost per year's lease would run $3,934.54.

Now, to compare, we must take our cost of only the items which they were to furnish. We spent as follows:

Repairs	$ 172.00
Body repairs, including $250, our cost of a collision	346.85
Tire repairs	11.75
Oil	54.26
Grease	63.10
License	281.28
Public liability insurance, $300,000	66.06
Property damage insurance, $50,000	134.92
Fire, theft, collision insurance	76.68
Total actually spent	$1,206.90

Now, what of depreciation and future costs of repairs and parts that are wearing out during this first year of normally trouble-free operation? Depreciation is a much misused word. We talk about allowable tax deduction and many other things when depreciation is mentioned.

But true depreciation on a truck depends on miles driven. Two trucks costing the same amount of money should not carry the same depreciation for cost purpose if one was driven 20,000 miles in a year while the other was driven 40,000 miles.

So this particular truck cost us $4,673.82. It has eight 9:20-12 ply

Vice-president of Purity Cylinder Gases, Inc., Grand Rapid, Mich. From an address presented at the 10th annual convention of the National Welding Supply Association.

to own?

firms have lower operating costs so they can sell you this service without a premium charge. They set up your program on a predetermined cost basis; that is, you know exactly what your trucking operations will cost every week. There is no fluctuation in operating costs as there is if you own your own trucks. This eliminates unnecessary bookkeeping.

It is important to keep your trucks looking well and in tip-top shape. In fact, it is as important as any other phase of your publicity program. Many companies owning trucks find this upkeep expensive and troublesome, but the professional maintenance care of a leasing company will solve this problem for you.

They regularly wash the trucks, keep air in the tires, and supply antifreeze and skid chains when necessary. They pay for all the gas. Even if your driver needs gas while on the road, he is reimbursed upon his return. Also, they furnish a daily record of each truck's departure from and return to the garage.

The trucks can be kept either in the leasing firm's garage or on your own premises. Suitable arrangements can be made in either case.

In case of an accident, the leasing concern takes care of all repairs at no cost to you. In event the truck can't be fixed immediately, a maintenance man gives your driver a replacement truck to use during the repair period.

Insurance is also the lessors' worry. They pay fire and theft insurance and provide for personal injury and property damage. The only insurance you need is for your merchandise on the trucks.

They Buy Your Trucks

If you now own trucks, the leasing company will buy them from you, converting your fixed investment into a current asset. If you don't own trucks, they will supply you with brand new ones designed to meet your requirements.

In any case, you operate these trucks as if they were your own. Your name only appears on the truck in the exact way that you want it. You pay the drivers, so you retain the same control over them you had before.

Still another economical advantage of leasing is that you contract for only your minimum requirements. They furnish extra trucks any time you need them on a daily basis, so you pay for extra trucks only when you use them. Thus, your problem for any rush business is solved.

The duration of your contract will depend on the size and type of vehicles you require and their cost. However, you can cancel it at any time by purchasing the trucks.

This system offers complete flexibility.

That leasing is now recognized as a good way to run your trucking operations is evidenced by the fact that 125,000 trucks were leased last year.

Acknowledgment—Data for this article was provided by Hertz Truck Rental System and Willett Truck Leasing Co., both of Chicago.

THIS is the first truck mentioned by Mr. Garman

NEWER, smaller truck is used on country route

and two 8:25-10 ply tires. These are special traction-lug tires costing about twice as much as a standard one. A complete set costs $1,225, but our tire man guaranteed 70,000 miles of use. There may be some accidents to tires, so we will estimate two complete replacements. This would make three sets during life of the truck, which we estimate to be 150,000 miles.

During this time we will spend 100% of its cost for repairs. This gives us as the following figures: two sets of replacement tires at $2,450; plus the original cost of truck, $4,673.82, plus repairs for its life, $4,673.82, or a total cost for 150,000 miles of $11,797.64.

This sum divided by 150,000 miles gives us a factor of $0.07865 per mile.

Total Operational Cost

The 22,719 miles that the truck was run multiplied by this factor gives us depreciation for 1953 (used, but not replaced, parts, tires, etc.) of $1,786.25 less the $530.60 actually spent, or a reserve of $1,256.25 to be applied against depreciation and future repairs. Our original figure for actual expenses which we quoted above was $1,206.90. Add the $1,256.25, and we get a total for 1953 operations of $2,463.15 for this one truck.

The leasing company's charges for the same service would have been $3,934.54, or $1,471.39 more than our cost.

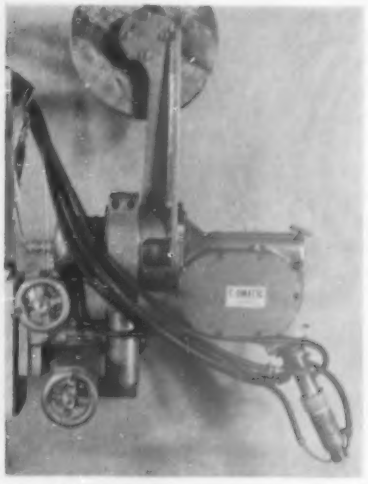
Here are some figures on an older truck which was about worn out. The leasing company was going to replace it with a new unit, allowing us market value for the old unit, which would surely be less than $500.

Purchased in November, 1947, at $3,765.13, this truck had been driven 163,835 miles and was good for another year on the job. However, these figures will be shown as though the truck was completely scrapped on Dec. 31, 1953, without any return for junk value or reasonable use of used tires.

Including original cost, licenses, insurance, etc., our cost on what the leasing company proposed to furnish was $10,610.94.

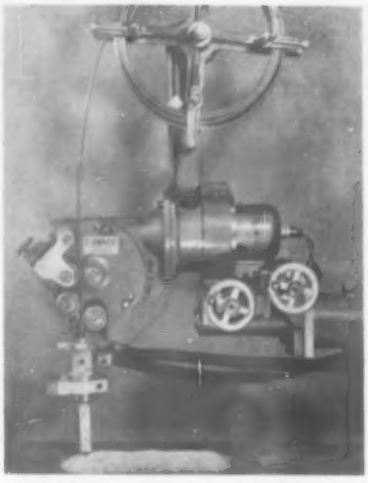
Their price for a new truck in this service was $38.08 per week plus 5¢ per mile, which, for the years we operated it, would have come to $20,225.03, or a difference in six years on one truck of $9,614.09.

Astounding isn't it?



1—NEW head for "C-Omatic" process is shown in closeup

With the addition of carbon dioxide, the Mig welding process now employs three inert gases. But because CO_2 is so much cheaper, many believe it will soon overtake argon and helium in the popularity race.



2—HEAD can be adapted for submerged-arc applications

Old gas—new application

BY T. B. JEFFERSON

NEW things are happening with an old gas, as far as arc welding is concerned.

For years the best arc welds have been made in a protective gas atmosphere—a CO_2 (carbon dioxide) gas atmosphere.

Technically, of course, the CO_2 is not "protective" because it dissociates in the arc zone and forms carbon monoxide and oxygen. There is, on the fringe of the arc stream, a recombination of carbon monoxide to carbon dioxide, so an analysis of the gases surrounding the arc indicates almost pure CO_2. Nevertheless, the gas in immediate vicinity of the arc is believed to be CO.

Some of the oxygen liberated or formed because of the dissociation immediately combines with some of the metal vapors, forming oxides. It is removed through smoke and fumes. The CO, however, will then combine with oxygen, which is in the atmosphere surrounding the arc stream, and thus will again form carbon dioxide.

But now something new has been added.

Instead of producing CO_2 through the decomposition of the flux ingredients in the electrode coating, commercially pure CO_2 is used as the only shield in Mig (metal inert-gas) welding mild steel.

While carbon dioxide has been used in conjunction with argon for Mig welding stainless steels, and in a few instances for Tig (tungsten inert-gas) welding these materials, A. O. Smith Corp., Milwaukee, has developed the process for use in Mig welding mild steel.

This process, a development of the company's research department, will be marketed by its Welding Division and will be known as "C-Omatic."

The process is now being used for standard production in three A. O. Smith plants.

With Mig welding now employing three inert gases, it will probably be necessary to designate the kind being used. Indications are, however, that CO_2 may soon become a most popular gas for Mig welding operations.

Several factors will account for this, but probably the most important is cost—CO_2 is about 1/9th the price of argon and 1/6th the price of helium, when purchased in cylinders.

This cost may be reduced even further by obtaining and storing carbon dioxide in liquid form for later conversion to gas for welding.

Tests in the A. O. Smith research laboratory also indicate that an ad-

Table I—TYPICAL CONDITIONS FOR MIG WELDING
MILD STEEL
WTH CARBON-DIOXIDE SHIELD

Thickness (in.)	1/16	1/8	1/4	1/2
No. of passes	1	1	1	1
Wire diameter (in.)	1/16	1/16	1/16	1/16
Wire feed (ipm)	300	300	350	350
CO_2 flow (cfh)	28	28	28	28
Weld speed (ipm)	150	80	20	14
Amperes	430	430	410	410
Voltage	27-28	25-26	30-31	30-31

ditional saving is made possible because not so much CO_2 is required. These tests show that a gas flow of 30 cubic feet per hour (in some instances as little as 20 cfh) will produce satisfactory welds; whereas argon requires a gas flow of at least 60 cfh and helium 70 cfh. In many instances even larger quantities are necessary.

Carbon dioxide is also more readily available. It can be obtained in every place in the country on short notice, for it is the gas that puts the fizz in the sodas at your corner drug store. Those that service the soda fountain will be more than happy to supply welding needs.

So welding distributors will be wise to keep up with this development.

Another factor favoring CO_2 Mig welding is the ease with which it may be used in welding mild steel. In this set-up it seems to combine the best features of the Mig and submerged-arc processes—without their inherent disadvantages.

There is a visible arc which can be properly located in the welding groove and observed while weld metal is being deposited by a low-operating-cost, automatic-welding process.

New Welding Head

Part of these advantages have been gained through a newly developed head that can be used for either Mig or submerged-arc welding (photos 1 and 2). Merely changing the nozzle and making a few minor electrical connections makes it adaptable to either.

The water-cooled gas nozzle is of brazed construction so that "O" rings are not required, thus eliminating a major cause of leaks. Shielding characteristics are believed to be improved because the nozzle provides a gas shield the full length of the contact tube.

The head is capable of wire speeds from 6 to 600 ipm (inches per minute) and has been used with both d-c rectifier and a-c transformer welders (on submerged-arc welding, a-c only).

3—LONGITUDINAL bend test shows excellent ductility and soundness

Best operating characteristics are obtained at high current densities. In fact, on a shop welding set-up using 1/16-in. wire, welding speed was 100 ipm at 420 amp, 30 volts. Some recommended conditions for welding mild steel are given in Table I.

The higher current densities which have been found most desirable for CO_2 Mig applications must be closely controlled, but they produce desirable results. Higher current density means faster burn-off of the electrode and consequent higher welding speeds. Higher current density also means a deeper penetrating arc and a full cross-section welding bead.

Chemistry

Chemistry has become an important part of every welding operation, and while chemistry should not be confusing to those in welding, there is a tendency to dodge the word.

The prevailing thought in welding chemistry is to use a welding wire that will insure a good weld joint. On occasions this may mean that a wire is alloyed so that deposited material might make up for deficiencies in the base metal.

When welding killed or semi-killed steel, many commercially available welding wires, developed for the metal inert-gas process, can also be used with A. O. Smith's new process with good results. However, when welding on rimmed steel, the wire composition must be adjusted in order to obtain sound welds.

While single-pass Mig welding with a CO_2 shield is conventional, multi-pass welding is possible. Likewise, although the generally accepted position is downhand, welds may be made in the horizontal position.

The size of horizontal fillets are limited because gravity quickly comes into play and causes the weld bead to favor the horizontal member, thus producing unsymmetrical legs of the fillet weld.

This is particularly true when making fillet welds larger than 5/16 in. When parts can be positioned for downhand fillet welding, extreme penetration and larger-size fillets can be obtained in one pass.

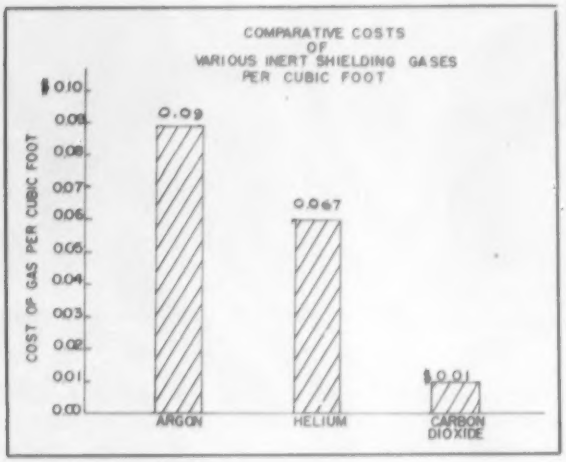
Mig and Mild Steel

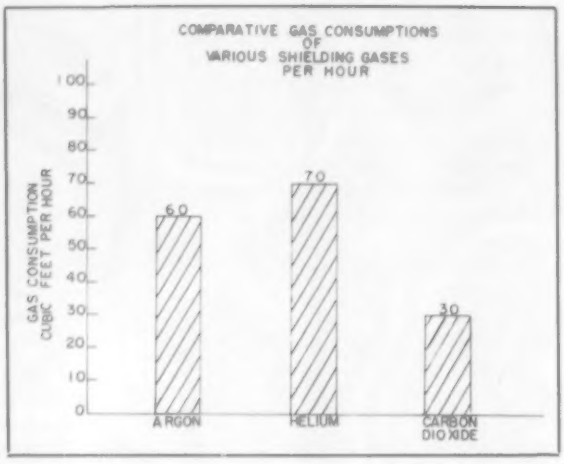
Several years of research seem to indicate that carbon dioxide is the ideal shielding gas for welding mild steel with the Mig process. If the base metal is killed steel, there is little to worry about. If not, the problem can readily be solved by selection of a welding wire whose composition will be compatible with the base metal.

When conditions (base metal and

4—CARBON dioxide was used as shield on this weld. Note broad penetration on bottom of deposit

5—ARGON was the inert gas used on this one. Penetration here is narrower at bottom





wire) are right, the weld deposit is free of such defects as cracks and porosity. While there may be a slight amount of scattered porosity near the overlap, it will be well within Class I rating for ASME radiographic standards.

Likewise, CO_2 Mig welds of mild steel show excellent ductility and soundness, as indicated by the 180-deg bend test (photo 3.)

Macro examinations of these welds also reveal their soundness, which is evident in the etched specimens in photo 4. Note the geometry of this weld made with 1/16-in. wire, and observe the type of penetration obtained with CO_2 gas for shielding, as compared with that obtained with an argon-gas shield (photo 5).

The characteristically broad penetration on the bottom of the weld deposit minimizes the danger of missing the root of the weld—a fault caused by misalignment of the wire in the groove. This type of penetration also is believed to improve soundness of the deposit at the junction line, allowing gases to be more easily liberated from the molten metal.

CO_2 in Production

In one A. O. Smith plant, the Mig-carbon-dioxide method is being used in production of small pressure vessels. A 9⅝-in. OD shell, having a ¼-in. wall thickness, is being joined to a silicon killed-steel forging (photo 6).

This girth seam is being welded at 22 ipm using 1/16-in. wire at 420 amp and 30 volts. Power source is a d-c rectifier welder, using reverse polarity. This job is a tough one because the welds must meet a minimum yield strength requirement of 70,000 psi and must pass stringent radiographic and magnetic-particle inspection.

In another application, the CO_2 process is being used for making lap welds on mild steel at extremely high speeds—100 ipm on 0.090-in. material. In this installation, more than 30 automatic welding heads are being used for high-production welding of automotive frames.

The fully automatic welding replaced manual arc welding.

5 Main Advantages

Inherent advantages claimed for the carbon dioxide Mig welding process can be summarized as follows:

(1) Low-cost, quality welding of low-carbon and medium-carbon steels;

(2) Visibility of the arc at all times for more positive control;

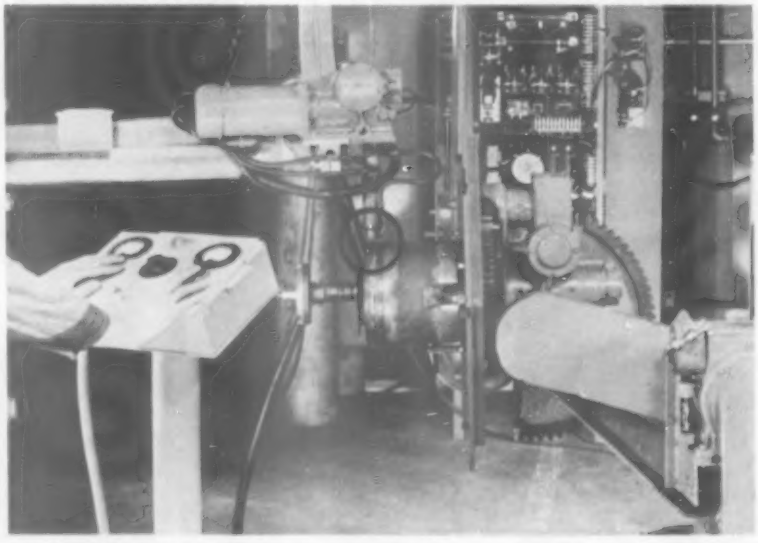
(3) Cleanliness of the weld does not require slag removal, nor is there any danger of slag entrapment in the weld itself;

(4) Absence of abrasive powdered flux in vicinity of welding operations, which may cause excess wear on moving parts;

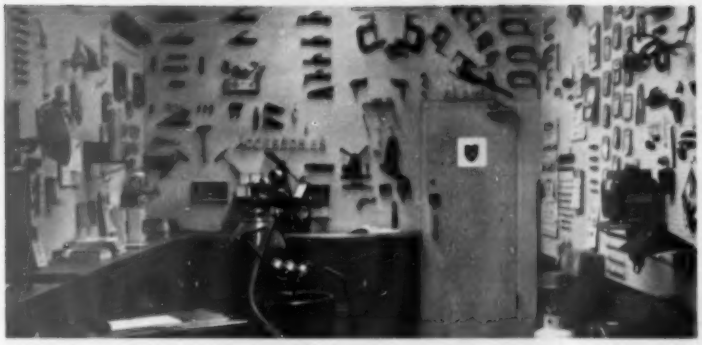
(5) Deep penetration and high metal deposition for single-pass welding.

Developments in CO_2 Mig welding will be watched closely. It may be just what industry has been awaiting. Mig and Tig processes have made little headway in mild steel, though they offer many advantages.

Possibly, this new application of an old gas is the answer.



6—GIRTH weld is being made on small pressure vessel through use of new CO_2 process and welding head (circle)



WHEN the contractor's price is too high, space is limited and you have too many counters already, it's a good idea to build your own displays and . . .

Hang it all on the wall

BY HERMAN C. PHELPS

A "do-it-yourself" program recently saved the owners of Independent Welding Supply Co., New York City, about $1,500.

A contractor had asked $3,000 to install peg boards, storage bins and lighting fixtures in the firm's 11 ft-by-25 ft store. This seemed like a lot of money for a small store, especially since the company did not own the building.

So Independent's two enterprising owners—Lou Adis and Frank Wunschel, Jr.—decided to do the work themselves. They not only did it for about half the quoted price, but they also added a balcony in the rear of the building.

The entire job was not so difficult as was first anticipated. Moving some protruding pipe proved to be the worst problem. Two more of the harder jobs were wiring for the full-length fluorescent lighting and nailing the firring strips used for anchoring the peg board. (These strips, 1½ in. square, are installed to provide space behind holes in the board so the hooks can be anchored firmly.)

Any doubts concerning the strength of the hooks and peg board are dispelled by the sight of a 100-lb welding machine that rests on a shelf supported by only two brackets hooked through the perforations. (At the time of this writer's visit, the board was painted a soft yellow that blended with the type of product displayed on the wall.)

Products displayed are all mounted in sections according to their applications. At the top of each display are colored signs made of mounted plastic letters which identify the process. Along the wall are cabinets, 3 ft high and 15 in. deep, that protrude into the room. Their sliding doors provide easy accessibility.

This storage space saves steps when a customer asks for an item hanging on a display board. The bulk of the stock is stored on the balcony in back of the offices (see sketch).

Displaying their product lines is the most economical and efficient method the owners know for reminding their customers of products they didn't anticipate buying. An example: a customer recently bought a $14 cylinder truck when all he came in for was an adapter for his acetylene regulator.

By today's standards, the surrounding neighborhood is rather run down and congested, but this adds to the impact of the store interior's effect.

Customers who telephone are served from two trucks; another truck is used for plant hauling only. Deliveries are made only as result of a telephone call. Drivers do *not* make regularly scheduled stops.

Morning deliveries are made to customers who phoned for service during the afternoon of the previous day.

Mr. Adis and Mr. Wunschel originally organized their firm in 1938 in a small store at Third Ave. and 142nd St. in the Bronx. But about a year later they had to move to larger quarters next door.

Business was progressing nicely when both were called into military service for three and a half years during World War II. However, members of their families conducted the business during their absence.

Today, Independent Welding Supply carries one of the largest stocks of welding supplies in metropolitan New York City and is equipped to handle export, as well as domestic, business.

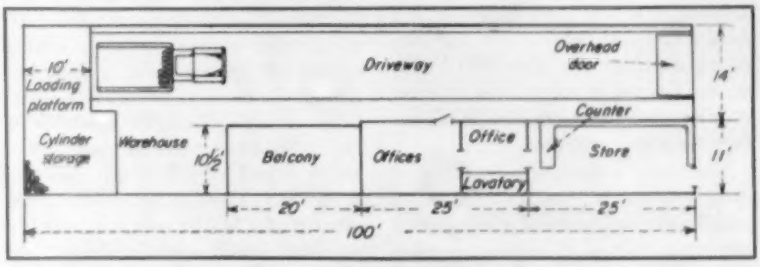
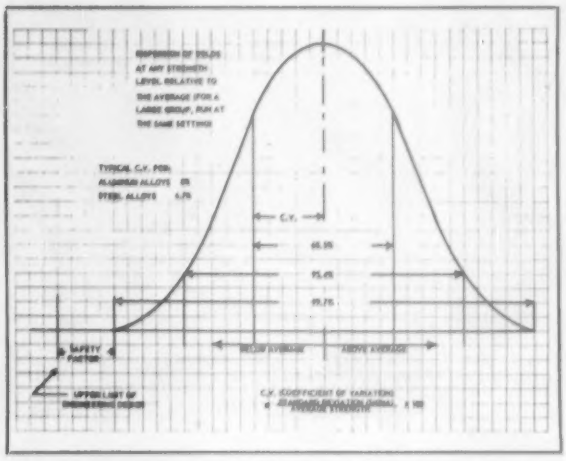
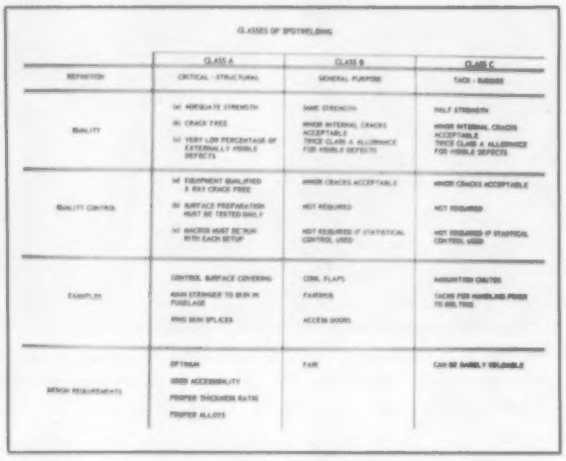


DIAGRAM shows floor plan of building. Store occupies only small part



A—SPOT welds obey the normal distribution pattern



B—CLASSES of spot welds and characteristics of each

Quality control of aircraft

BY C. B. SMITH

MAINTAINING weld quality in building some of today's huge aircraft is a big job. With increasing complexity of aircraft, the system of quality control becomes more important.

To insure consistent quality of welds, Douglas Aircraft Co., Long Beach, Calif., has developed a control system of instrument checks and reports. The use of appropriate check charts can be of great advantage in indicating trends which are often forerunners of actual trouble.

Although nearly all manufacturing processes are used in fabricating aircraft, spot welding has distinct advantages.

Spot Welding Is Faster

Fabrication of high-strength aluminum alloys (such as 75S) by riveting requires use of a hot dimpling technique that is as complicated but not so fast as spot welding. This has resulted in greater consideration being given to spot welding of structural components.

The bulk of aircraft spot welding, Douglas has found, is of the general utility items such as a plane's fairing. The fairing is the forward section of a craft's nose and its smooth outline is designed to reduce drag. (Not all spot-welded assemblies are so readily joined as this one, however, where the contour is gradual, the accessibility good and gage combinations favorable.)

Some Attachments

Spot welding is often used for engineering reasons, and special attachments must then be added to the welding machine in order to weld the item, as in the flap assembly (photos 1 and 2). Sometimes a combination of spot and seam welding is used. Then the fairing is spot welded to the tab skin in the flat, folded, and seam welded to the leading edge. Seam welding is also used on many tube assemblies.

In the spot weld department at Douglas, the work is moved on rolling tables and a set-up location is provided near the welding machines. This helps to minimize parts handling and reduce cleaning. Cleaning and deoxidizing the aluminum is done in a tank set-up. Control of the process solution is maintained through use of a surface resistance analyzer.

The most important advantage of spot welding is that it lends itself readily to mathematical analysis and statistical control. Extensive research and experience has shown that spot welds follow the normal distribution pattern (see Fig. A).

When a designer plans an arbitrary level of strength, the quality-control man, knowing the characterstics of his spot weld equipment, can set his average strength sufficiently high so that no appreciable quantity of his welds will fall below the design maximum.

Figure B lists the various classes of spot welding and their characteristics.

Relative design-strength allowables for single welds made on various thicknesses of the alloys are based on Specification ANC-5, "Strength of Metal Aircraft Elements." (This strength data is a summary of the experience of many of the aircraft companies and research institutes, prior to 1951.)

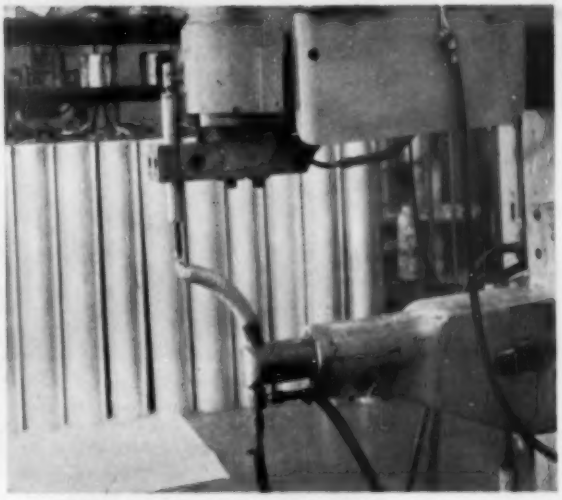
Testing Machines

In evaluating the strength of spot welds, equipment such as the portable shop strength-test machine depicted in photo 3 is used. To eliminate an appreciable waiting period in setting up a welding machine, a sufficient quantity of these and similar (but stationary) tools should be available. A ratio of one tester to each four or five welders, and one for each isolated welder has proved to be adequate. Another useful machine is a laboratory precision tensile-test machine.

Spot welding of titanium and of

This article is based on a talk delivered by the author, a welding engineer, before the Aircraft and Rocketry Panel, Los Angeles Section, American Welding Society.

1—FLAP assembly is more difficult to weld, so a special attachment has to be made



2—SPECIAL set-up for spot welding of the flap assembly. Note lower arm

welds

chrome-moly steels may result in brittle welds if not properly done. The relative acceptability of these welds can be determined by tension tests (or the ratio of tension tests to shear tests). These tension tests require special jigs in evaluating the tension strength of the spot weld in a standard testing machine.

As the quality of spot welding has been improved to meet the needs of more important applications, the spot welding equipment has grown more complex. Operators must know how to use various control panels, switches and dials. In addition, operators are required to make and evaluate macro sections of spot welds to prove weld size, proper penetration, and freedom from defects.

When seam welding is involved, pressure test coupons are usually used in addition to macro specimens.

The statistical control system is extremely important at Douglas Aircraft. Figure C shows a typical statistical control chart with instructions for use. A key item in the system is this control chart, oriented to run vertically with setting details down the right hand margin. Sequence of filling in items, evaluating tests, securing approval and subsequent use at stated intervals is shown in the marginal notes.

Limit lines are set up on the basis of the average strength of a sample size of three, and, to meet the coefficient of variation requirements of 8% for aluminum and 6.7% for steel alloys, the strengths are plotted individually. This controls range and average on one chart; one point falling outside calls for corrective action.

Reasons for Control

Reasons for use of statistical control are many. Properly used it will indicate trouble ahead before an actual rejectable condition has occurred.

An example: if strength of the weld approaches the low limit line while the heat setting is moved toward its upper limit, it is an indication that some item in the equipment needs attention. This item might be as simple as the electrode contour or more serious electrical or mechanical maintenance.

In addition, statistical control properly used can reduce the amount of testing required by specification.

To get the greatest benefit from the

BASIC ITEMS ON OPERATOR TESTS

A. TO RECEIVE AN OPERATOR STAMP, AFTER A PERIOD AS A TRAINEE, THE MAN MUST DEMONSTRATE A SATISFACTORY KNOWLEDGE OF THE FOLLOWING.

1. RECOGNIZE WELDABILITY.
   (a) CLEANLINESS OF WORK.
   (b) ETCH DATE.
   (c) FIT.
   (d) EDGE DISTANCE.
   (e) CHANGE IN JOINT CONDITION (2 TO 3 THICKNESS OR SOFT TO HARD OR GAGE CHANGE).

2. RECOGNIZE DEFECTIVE WELDING.
   (a) DIRTY SPOTS.
   (b) CRACKS.
   (c) SPLASHES.
   (d) WELDS BREAK LOOSE.
   (e) OUT OF ROUND.
   (f) ROUGHNESS (OUT OF LEVEL, TOO SMALL FACE, WRONG SET UP, POOR FIT, NO E.D.)
   (g) SPOT PATTERN - STAY OUT AREAS.

3. BASIC MACHINE CARE.
   (a) CLEANLINESS.
   (b) MECHANICAL TIGHTNESS.
   (c) WATER AND AIR LEAKS.

4. CONTROL PROCEDURE.
   (a) WHEN TESTS MUST BE MADE.
   (b) THAT RECORDS OF TESTS MUST BE MAINTAINED.
   (c) WHERE TO GO TO GET THE TESTS MADE.

THIS ENTITLES HIM TO OPERATE A MACHINE AFTER A LEADMAN, SPOTWELDER MECHANIC OR "A" OPERATOR HAS COMPLETED ALL TESTING AND MADE ALL NECESSARY ADJUSTMENTS.

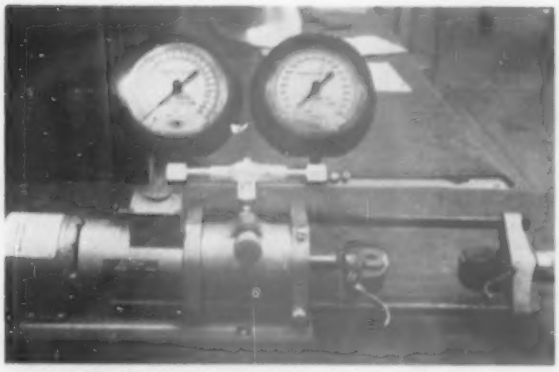
B. TO PROGRESS TO "A" SPOTWELDER, THE MAN MUST, IN ADDITION TO THE POINTS PREVIOUSLY LISTED, HAVE AN ACCEPTABLE KNOWLEDGE OF THE FOLLOWING.

1. CONTROL PROCEDURE.
   (a) OPERATE THE TEST MACHINE.
   (b) PREPARE MACRO SPECIMENS.
   (c) READ AND INTERPRET SETTINGS.
   (d) RECORD DATA AS REQUIRED BY CERTIFICATION CARDS.
   (e) KNOW WHEN TESTS ARE REQUIRED AND MAKE THEM.
   (f) KNOWS WHO APPROVES MACROS AND SCHEDULES.
   (g) KNOWS THE PROVISIONS OF DPS 10.000, 10.001.

2. SET UP HIS ASSIGNED MACHINE. (MORE DIFFERENT KINDS OF CONTROLS.)
   (a) TURN ON POWER, WATER, AIR.
   (b) CHECK GAGES AND OILERS.
   (c) CHECK HIS JOB PER ITEM 1 AND SELECT PROPER SET UP.
   (d) PERFORM ITEM 4.
   (e) WELD, ITEM 2.

3. KNOW THE EFFECT OF TWISTING KNOBS ON HIS ASSIGNED MACHINE.
   (a) KNOWS THE EFFECT OF TWISTING KNOBS ON HIS ASSIGNED MACHINE FROM INSTRUCTIONS (RECOMMENDED SETTINGS).
   (b) WELL ENOUGH TO CORRECT FOR DEFECTIVE WELDING WITHIN THE ALLOWABLE LIMITS OF THE CONTROL CARDS.
   (c) WELL ENOUGH TO KNOW WHICH ONES AFFECT WELD QUALITY AND WHICH ONLY AFFECT SPEED OF PRODUCTION.

C. TO PROGRESS TO LEADMAN, OR SPOTWELDER MECHANIC, THE MAN MUST KNOW HOW TO SET UP A MACHINE WITHOUT RECOMMENDED SETTINGS.



3—PORTABLE machine is for determination of weld strength. Stationary strength-testing equipment is also used

4—EQUIPMENT used in testing also includes oscillograph, force-pickup-toroid integrator and d-c amplifier and strain-gage amplifier

control system, Douglas feels it is necessary to have a key nucleus of trained people with proper and sufficient equipment. They need to understand and be interested in their jobs. Because of this Douglas has developed an extensive training and inspection program.

In providing personnel for the process aspects of weld inspection, operator training, aid to fabrication, planning and engineering, the process engineering group plays a major role.

The process inspectors give tests to qualify the operators; approve and certify the control charts; check each operator at least once daily on each shift for process control items; prepare weekly reports on the general percentage of error the operators make; and once each month screen their reports to determine which particular operators may need additional training.

Other Equipment

Another group working under the welding engineer conducts a portion of the preventive-maintenance program by running oscillographic checks at least once monthly on each piece of welding equipment using a standard setting.

The results of these checks are recorded and compared with data taken under the same conditions on the same equipment in the preceding month. Appreciable change in the performance on the machine calls for immediate corrective maintenance action.

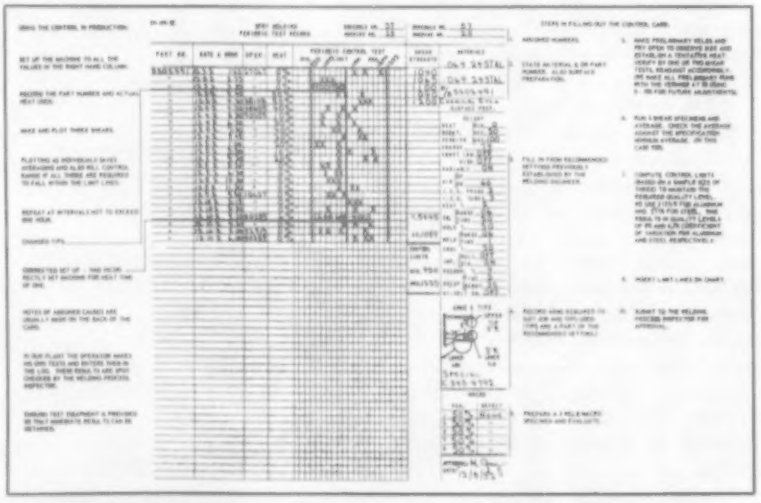
Special equipment is used in oscillographic tests (photo 4). In these cases force measurements are made using special electrode holders incorporating strain gages, while current measurements are made using a toroid pick-up placed around a portion of the secondary loop. The strain-gage electrode can be calibrated on a laboratory testing machine, and the toroid by means of an a-c ammeter, under static conditions. Conversion from deflection of the pen to amperes or pounds of force can be readily accomplished.

The strain-gage-beam technique is an alternate procedure for force measurements. In this, a leaf spring connected by a cord to the lower arm of the machine is used. The spring acts as a beam, deflecting as the arm on the machine deflects, and actuating strain gages accordingly.

The strain-gage-beam technique is necessary on a seam welder and optional on a spot welder. It has the disadvantage of requiring calibration with an auxiliary force gage each time it is used if quantitive measurements of force are required.

On the other hand, while the special electrode holder can be calibrated, giving quantitative force readings which are reliable over a long time period, it tends to pick up interference from the welding current. To overcome this deficiency, traces can be made with the current turned off and superimposed on those made with the current on, thereby eliminating the hash.

If there is an indication of malfunction in control of the welding machine, such as skipping a pulse from one leg of the three-phase supply, the trouble source can be isolated by placing the toroid coil successively around each of the three-phase leads and noting where the fault lies.



C—TYPICAL statistical quality-control chart includes instructions for use

LOOK!

Welding Clinic and Open House

REMEMBER THE DATES NOV. 19th and 20th

You are invited to mark your calendar now to attend Baltimore's first welding clinic staged by EARLBECK & LANDRUM, INC. It will be held at our 1023 Cathedral St. store and warehouse on November 19th and 20th from 2 to 9 p.m.

You will see working demonstrations and exhibits of almost all the many fine lin that we distribute and the booths will be manned by factory engineers who will show ow to sol our tr weldin brazing lems. H just a fe the r g air ods ues ted

PUBLICITY prior to Earlbeck & Landrum's clinic was an important phase in planning. Reproduced above is a portion of a page from the firm's house organ announcing the event. Pictures accompanying this article were taken at the show, held late last year

How we run a welding clinic

BY A. C. EARLBECK

THE welding show and clinic as run by individual distributors has proved to be a valuable tool for attracting attention to the firm and as an aid in sales.

When Earlbeck and Landrum, Inc., Baltimore welding distributor, conducts a welding show and clinic, it follows a three step formula:

(1) Planning and prior publicity

(2) Conducting the show itself

(3) Putting the show to work to increase sales and post-publicity.

To illustrate, here is how we followed this formula when we ran our last clinic:

Planning

About three months before showtime, we mailed approximately 30 letters to manufacturers we represent inviting them to participate. Our basic intention was that every exhibit, if possible, be a working one. Our guests, therefore, could personally try a particular product or welding process and thereby learn something new about welding. We wanted things moving, wheels turning and arcs and oxyacetylene flames in action throughout the show.

To accomplish this, we asked manufacturers to provide personnel to man their booths.

In order to achieve maximum attendance, we publicized the event in the following ways:

(1) The front page of two issues of our house organ, "The Fleetweldor," announced the show and extended an invitation to attend our exhibit.

(2) A few local spot newspaper advertisements were bought just before showtime.

(3) Two months before the show, we attached 6 ft by 2 ft signs on top of all our trucks announcing the time and place.

(4) Trade journals were notified and each ran a news item.

(5) Large signs, inviting all our customers, were placed in our warehouse, office, showroom and in our front-office window.

(6) The chairman of the local Maryland Section of the American Welding Society announced our show from the floor at one of the monthly meetings.

(7) An advertisement was run on the back page of the Maryland Section's announcement bulletin.

(8) For three months prior to the show, all of our seven outside men were notifying customers.

(9) Last, *but most important of all,* the day before and the two mornings during the show, all salesmen called almost every customer or prospect on the phone. About 400 phone calls were made these three days, and many guests would not have attended had they not been phoned. Under pressure of their personal business problems, our event had slipped their minds.

Compressed air, three-phase and single-phase current, oxygen, acetylene, argon and water were piped into all booths requiring them. Necessary chairs and tables were rented. And, in order to dress up these tables, we purchased card stock in two colors (which is fairly inexpensive) and stapled them to all tables.

The Show Itself

Beer and soft drinks were purchased, and the necessary cooling equipment was furnished at no charge by the beverage supplier. Pretzels and chips were also bought.

For one full week prior to and dur-

RAPT look on young girl indicates she realized soldering outfit was more than a plaything. She was one of many youngsters at the show

ALMOST 700 persons attended the Baltimore welding clinic, which had 23 exhibits

PORTABLE electric tools, as well as other accessories, were exhibited

ing the show a sign painter was hired on a full-time basis. He made signs to hang over each booth—signs with prices for each piece of equipment; signs inviting everyone to actually try the process or product. The painter also made any special signs that factory representatives wanted during the show.

In two booths where manufacturers did not send factory engineers to do the demonstrating, we hired outside help to man the exhibits. This kept all our service and welding technicians free to mingle with, and answer questions from, the guests.

Registration books were placed at the entrance, and each guest was asked to sign his name, company affiliation, title and address before entering. To encourage registration, a door prize—a twin carbon-arc torch—was awarded.

A commercial photographer was on hand to give us a complete photographic record of our exhibit. The pictures on these pages are part of this record.

With just one exception, every machine and piece of equipment demonstrated came from our inventory, and this fact was impressed upon the guests. In our opinion, this ability to give customers a representative source of supply, along with necessary know-how and technical advice of our welding engineers and technicians, is what makes a modern welding supply house.

Sales and Post-Publicity

Many sales were made right on the floor, and every lead was given to a salesman for prompt follow-up. After the clinic, news releases giving facts, figures and pictures were promptly mailed to the trade publications.

Twenty-seven "thank-you" letters expressing appreciation for the splendid cooperation shown by our suppliers were mailed. This was a very important step in further welding (*pun intended*) our fine distributor-manufacturer relationships.

Loose-leaf booklets with photos of the show were compiled and distributed to all our salesmen. This enabled them, on future calls, to "take the show" to anyone who had missed it (as well as to those who were there). The booklet also graphically presented the different types of welding equipment and supplies that Earlbeck and Landrum usually carries in stock.

During a normally slow month following our clinic, sales ran well above average. This, we firmly believe, was a direct result of the show and vivid proof that, if properly handled, a welding clinic and show will amply reward a distributor for his time and effort in conducting it.

ELECTRODES were demonstrated behind protective shields

RESISTANCE welding machines were also in evidence

The oxyacetylene cutting process is an important tool of the shipbuilding industry. But frequently a yard experiments with other gases, only to find that acetylene is still the better and more economical cutting agent.

This article also tells you how one shipyard adapted already widely applied commercial equipment to make it even more useful.—The Editors

AERIAL view of the Ingalls Shipbuilding Co. at Pascagoula, Miss. The yard covers 154 acres

Cutting and gouging in a shipyard

BY THOMAS J. DAWSON*

SHIPBUILDING and heavy steel fabrication might be termed "custom construction." There is little demand for duplication found in other types of industry. In general, there are only two pieces on a ship exactly alike—one on the port and one on the starboard side.

This and other factors in heavy construction necessitate a great deal more flexibility and multiplicity in equipment than is required in other types of industry.

The Ingalls Co.'s shipyard at Pascagoula, Miss., is laid out along the Pascagoula River and consists of 154 acres. The yard is adequately covered by a rail system which is served by Diesel locomotive cranes.

Construction capacity is approximately 200 tons of steel per day. Most of this steel is pickled prior to fabrication and covered with a temporary preservative. Painting is not performed until erection. This temporary preservative is a semi-drying oil type material, which leaves a thin oil film on the steel that prevents excessive rusting and corroding.

This material was selected because it would not affect burning and welding operations.

Central Distribution

The entire plant area is serviced by oxygen and acetylene piped from central distribution points. Oxygen is delivered to the yard in cylinder-tank trucks. Oxygen pressure is controlled at the distribution point.

Acetylene is generated in the plant from carbide. Under average conditions, monthly carbide consumption is about 40 tons. Acetylene gas is manufactured by six generators located in a special building near the edge of the yard and close to the water. Each generator is capable of generating 1,000 cu ft of acetylene per hour.

Special headers that will accommodate 18 oxyacetylene outfits have been developed for shipboard use. They are of two types—one for use without regulators for burning and gouging; the other for use with regulators for welding. These headers are always placed on the topmost strength deck of a vessel during construction. They are placed at strategic intervals along the deck, and are never placed inside the enclosed structure.

Average consumption of oxygen per ton of steel erected depends on the state of construction. In the early stages when considerable cutting is required, the ratio of oxygen to acetylene differs from that during the outfitting period. A figure of about 200 cu ft of acetylene and a 1,000 cu ft of oxygene per ton of steel would not be a bad average for shipbuilding.

Fuel Gases vs. Acetylene

Since oxygen-acetylene is a large item of cost, Ingalls is constantly on the outlook for some means of economizing on these materials. A number of fuel gases have been tested in comparison with acetylene. But acetylene was found to be more economical.

More oxygen was required to burn one of the more efficient fuel gases than was needed to burn acetylene. Operation was slower because the flame temperature obtained with the fuel gas was not so high as could be obtained with acetylene.

For example, in 1-in. plate with double beveling, 55 seconds preheat time was required for fuel gas in comparison with 23.3 seconds for acetylene. Preheat oxygen required for the fuel gas was 45.7 cu ft per hour, while the acetylene required 28.3 cfh of oxygen for the preheat flame. Of course, the amount of oxygen used during both burning operations was almost equal because of the major oxygen consumption by steel itself.

The speed of burning was slow in all cases in order to maintain the quality cutting found in the use of acetylene.

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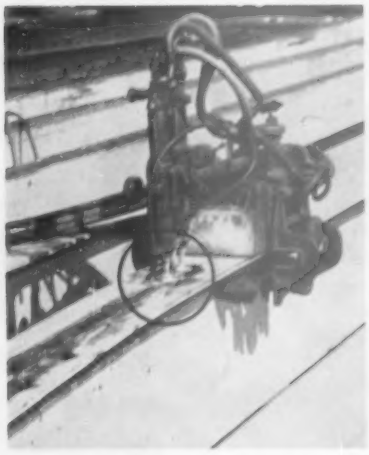
*Metallurgist, Ingalls Shipbuilding Co., Pascagoula, Miss. This article has been prepared from a paper presented by Mr. Dawson at the 55th annual convention of the International Acetylene Association, held March 22-24, 1955, at Houston.



WATER spray from attachment (circle) limits heat transfer input into steel, helps avoid distortion

A burning speed of 10.4 inches per minute was obtained with fuel gas, while a speed of 13.1 ipm was achieved with acetylene. The large differences that were shown in all other cases were not explainable. It was theorized that the preheat temperature would not be so important as it was.

It is possible that the figures might change to some extent with further experiments. However, the tests were conducted in the presence of supervision, laboratory personnel and representatives of the fuel-gas manufacturer.

Mechanical Equipment

Mechanized cutting equipment is used extensively in the shops and is supplemented by manual burning throughout the yard, as well as by specialized equipment adapted for field use. Special burning equipment is used on the platens because considerable fabrication is accomplished prior to assembly. In one operation, two plate edges are burned simultaneously prior to fitting for automatic welding. Special rigs have been designed to serve as guides and contour controls.

Several applications for commercial equipment have been developed by altering it slightly to meet Ingalls' needs. In other cases, equipment has been developed locally, and some of it has been patented.

An automatic flame-cutting machine designed for such purposes is used to trim the flanges from *H* or *I* beams to make them into *T* sections. However, a water attachment has been added. The sprayed water is used to limit the heat transfer or heat input into the steel itself. By this innovation we have practically eliminated the distortion that usually occurs in beams when prepared in this manner.

An interesting point that research has not yet explained: similar beams react differently to this operation. Water cooling will leave some 90 to 95% of the beams in a satisfactory condition for immediate use. Hardness tests on these beams seem to indicate that material in the softest condition will distort the greatest when the flanges are trimmed.

The operators have proved that, as in most operations, they are the key to its success. By varying the flow of water, they can control to a large degree the distortion that might occur.

A special burning apparatus has been developed at Ingalls to prepare large pressure-vessel heads for welding. It would cost approximately $20 per head on the larger sizes to have the beveling done at the mill. This can be performed quite economically with burning machines illustrated.

Gouging

Gouging is used extensively at Ingalls not only in ship construction but also in fabrication of pressure vessels. One side of the plate is frequently prepared with a single vee by flame-cutting to a fraction of the plate thickness and back-gouging the opposite side of the plate after welding the prepared vee.

An example: after welding a cylindrical section of a pressure vessel, the seam is back-gouged on the outside to sound metal, leaving a "U" groove preparation.

The square edge on one half or more of the plate thickness aids in fitting. The thicker shoulder also provides adequate backing for full heat, thus getting greatest efficiency from automatic welding operations. Gouging, like all other operations wherein heat input must be carefully controlled to avoid distortion, must be given careful consideration by the welding engineer.

Experience at Ingalls has shown that in some instances proper application of flame-gouging produces less distortion than full preparation of plate edges. If the unit has been given the greatest amount of stiffness prior to flame-gouging, then distortion that might have occurred, had the full plate edge preparation been made while the plate was still in the flat condition, will be prevented.

On thin-plate construction, where plates are to be used in the flat (such as bulkheads), flame-gouging definitely has its limitations because of resulting distortion.

As an Inspection Tool

Flame-gouging is used extensively as an inspection tool in shipbuilding. In large field operations, it is an economical tool for inspection of weld quality. It is used where normally X-ray inspection might be designated or where cutting of a trepan section is called for.

The metal is washed in thin layers. The washing action is observed by an inspector until the flame-gouging has reached a depth where a defect might be suspected. This is more economical than rigging up the special tools to cut a trepan section or to make a radiograph of an area. The cost of re-welding is no greater than the repair of an area from where a trepan section has been taken.

The removal of flaws after detection by radiographic examination is simplified by the use of a flame-gouger. Observation during washing aids in the detection of small flaws, such as slag inclusions along the edge of a bead, which are difficult to find by chipping. For these reasons, the flame-gouging torch has proved economical.

CUTTING apparatus was developed at yard to prepare pressure-vessel heads for welding

CRACK in this differential case extended across side and bottom of casting for distance of 45 in.

SKIP-welding technique was used to keep heat to a minimum. No preheating was necessary

Low-heat welding of cast iron

The author last month described oxyacetylene-torch applications. Here he gives you some examples which show how the electric-arc process was used.

BY ARTHUR L. PHILLIPS
Eutectic Welding Alloys Corp.

WHEN heavy iron castings have to be joined or repaired, the quickest, most economical and satisfactory method of doing either is by electric-arc welding.

This process has always been associated with fusion welding, but developments in welding technology have made it possible to apply deposits with the arc without melting the base metal.

Recommended for such use is an electrode that gives high-strength machinable deposits on cast iron. Possessing high tensile strength, it can be used on most grades of cast iron and will join cast iron to steel. It can be used without preheating the parent metal.

The core wire of the electrode is heavily coated with a special mixture which performs a function similar to that of a flux used with a torch alloy. Constituents of the coating promote surface alloying, and residue remaining on the surface of deposits has a low melting point.

Application

The method of application differs from that of conventional electrodes. Melting the parent metal and digging in is unnecessary and should be avoided because deposits will pick up carbon. This carbon pick-up would mean the formation of iron carbide, which would render the weldment non-machinable.

When a crack developed in the main differential case of a tractor (a grey iron casting), it presented a major repair problem. The crack extended from the tip of the casting diagonally to the bottom corner and was 27 in. long. It continued 18 in. more across the base to the foot of the clutch pedal (see photos).

No preheating facilities were available for so large a part, so it was necessary to repair the casting "cold." The metal ranged in thickness from ½ to 1¾ in., and the cracks extended through drilled and tapped holes. A replacement of the 3,090-lb casting would cost $1,415.

The cracks were veed with a grooving and chamfering electrode. This removed the fatigued and defective metal to required depth. After a light brushing with a wire brush, the cracks were ready for welding The grooving operation was so rapid that heat was confined to vicinity of the groove. This had the additional advantage of removing the chill from the weld area.

The machine was reset at 95 amp for a 5/32-in. electrode. The arc was struck on a piece of scrap metal, which was positioned at about center of the weld area. When the arc was running freely on the scrap metal, sufficient heat had been transferred to the base metal for deposits to alloy with it. Deposits were then flowed onto the veed section, permitting molten filler metal to alloy with the solid base metal. Subsequent beads were laid with the arc directed at all times upon deposited metal.

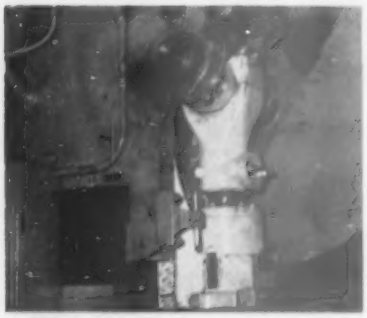
At no time did the arc come directly in contact with the base metal.

Deposits Peened

Deposits of approximately 1½ in. in length were made and promptly peened. This expanded heated metal and minimized danger of contractual cracks developing.

The next pass was made a few inches to the right of the first deposits, and the following pass a few inches to the left. This skip-welding technique prevented a local build-up of heat. No deposit was applied adjacent another deposit until a hand could be placed on top of the weldment without discomfort. At no time did heat color show in the parent metal.

When the outside weld was completed, the same procedure was con-



WHEN a crack appeared in frame of this 60-ton press, a repair was essential

CLOSE-up of weld. Rapid solidification of deposits minimized danger of porosity

tinued on the inside. The crack was veed with a chamfering electrode to a depth where weld metal was encountered. This was important because it insured a sound bond and permitted root beads of the double vee to alloy with each other.

This extensive repair was completed in 18 hours (welding time) and required 15 lb of filler metal. The estimated saving against the cost of replacement was $1,318. This included estimates for all labor, materials, machine time, etc.

The tractor was restored to service and has been operating for over a year without sign of weld failure.

"Dirty" Cast Iron

A problem often encountered in cast iron repairs is rusty, dirty, or oil-impregnated metal. Deposits are difficult to apply and do not bond readily to contaminated surfaces. Pinholes and porosity are present in the welds, and there is an overall weakness. Occasionally, parts are rejected as unrepairable on grounds that an efficient repair is impossible upon such metal.

Much of the difficulty arises from gases released during welding. When metal has been exposed to grease or oil over a long period of time, the metal becomes impregnated. When heated, the oil seeps through the pores of the metal and vaporizes. Hydrogen or nitrogen is released. This gas tries to escape through the molten metal. Some of it is trapped and forms porosity in the weld metal. That gas which escapes forms pinholes and surface porosity.

High fluidity, usually a desirable characteristic in a filler metal, is a disadvantage in welding metal of this type. Slower solidification permits the gas to penetrate the molten metal and either reach the surface or remain entrapped in the deposits.

The 60-ton press illustrated was salvaged through use of an electrode that has a rapid solidification rate. When applied to oily cast iron, it solidifies and seals metal pores. No gases can escape. Therefore, deposits are sound, dense and free from porosity and pinholes.

When a crack developed in the press frame, a replacement was ordered because production schedules had to be met. Delivery would take eight months, making it necessary to attempt a repair by welding to continue production.

The metal was impregnated with oil, and no amount of cleaning produced a satisfactory surface. Machinability of the weld deposit was unnecessary, but a high strength bond was essential.

Crack Was Veed

The crack was veed to the necessary depth, as in the differential case, to remove fatigued and defective metal. A hole was drilled at the end of the crack to prevent its extending further. Short stringer beads about 1 in. long were applied with a skip-welding technique and promptly peened to relieve residual stresses.

Root beads were ground to determine if any porosity existed in the deposited metal, and to test the bond strength. When they were found to be dense and solid and had surface-alloyed with the base metal, the weldment was completed.

Deposits applied with this type of alloy are not machinable. But when machinable deposits are required on the face of a part, it is possible to obtain them and still utilize the bonding and sealing properties of the faster-solidifying alloy. Here's how:

Apply the root beads with the non-machinable alloy, and pad the sides of the vee. Deposits will alloy with the oily base metal and present a surface of clean metal to which subsequent deposits will bond without difficulty.

Finish the weldment with a machinable-type alloy designed for cast iron. This method will give necessary bond strength and still provide a machinable surface.

Malleable Cast Iron

Malleable cast iron is increasing in popularity. It has greater strength and higher ductility than grey cast iron. It has the advantages of grey cast iron without its brittleness and weakness. It resembles steel in ductility.

A lengthy annealing process is necessary in the manufacture of malleable cast iron, and if this heat is exceeded (approximately 1,400 F), the carbon will go into solution. This will solidify as cementite unless the part is malleablized again.

When malleable iron is fusion welded, both filler metal and base metal are in a liquid state. Consequently, the carbon goes into solution and is picked up by the filler metal. The base metal in the weld area is in a molten state, and on either side of this area the heat exceeds annealing temperature of 1,400 F.

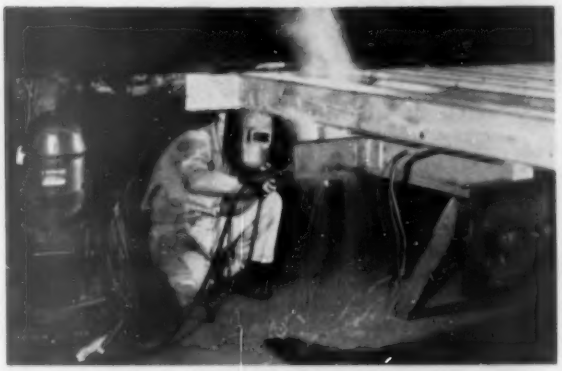
After welding, hardened cementite zone surrounds the weld area. This zone is brittle and may not withstand service conditions, and the casting is no longer malleable iron.

When the low-heat process is used, the heat of the part remains below critical temperature. In torch applications, a flux-coated, bronze-type alloy is used. A neutral flame of an oxyacetylene torch should be used to heat the area. Melt flux off the rod onto sides of the vee, and, when it remelts, apply the alloy.

When the flux liquefies, it indicates approximate bonding temperature of the base metal, so change the angle of the torch to horizontal. Direct the flame onto the rod, and flow out each bead until it has alloyed to both sides of the vee. When the torch is held at this angle, sufficient heat will be absorbed by the casting to keep it at a bonding temperature, but it will not be overheated.

The valuable properties of the metal will be retained if this method is used, but the weldment will not

(Continued on page 57)



SEVERAL feet of framework were added to an obsolete unit and axles were reset at the body building and maintenance shops of The Baltimore Transfer Co. Work was done for Motor Freight Express, Inc., a sister company

EXTENSIONS, top and end, are clearly shown. This picture was taken before the entire unit was painted to indicate how fabrication with the help of aluminum welding revitalized an otherwise undersized unit

PREVENTIVE MAINTENANCE

Welding keeps things moving

BY WARD L. BENNETT*

IF we were called upon to select the one most useful and versatile tool in our planned program of body building and preventive maintenance —to keep a fleet of a thousand trucks, trailers and tractors rolling — there would be little or no hesitancy about the answer. Our electric arc welders are in daily use, for a hundred and one different jobs.

There is at least one such versatile unit in the main truck-trailer body and maintenance shops at Baltimore and at each of the 13 other terminals in the District of Columbia and the five Middle Atlantic states. They are ready at all times for a rebuilding or a major or minor-repair assignment on a truck or trailer—or to put together a dolly or a trailer dock.

An example of the value of these units: they have been used in the money-saving job of building the platform trucks that shift thousands of pieces of freight around the BT-MFX System's platform 24 hours a day. To date, the welders have been used in fabricating 250 of these four-wheel dolly carts. The electric welding units enable us to do an assembly job that results in substantial savings.

In recent years operating costs have mounted steadily. Vans that were considered big a half dozen years ago — 24-ft semi-trailers, for example — are now unprofitable for over-the-road hauls. Newer units added to the fleet are usually 6 to 8 ft longer than those older ones.

But with our *preventive* maintenance program keeping trailers and other units in excellent shape, even after 6, 8 or 10 years of tough usage, it seems poor business to scrap the older ones simply because of space limitation. So we've set the welders to work on another rebuilding program.

By adding 7 or 8 in. to the height and 6 ft to the length (see photos above), we are increasing the payload-carrying capacity of a number of trailers by dozens of cubic feet and thousands of pounds each. Also added are new and stronger axles.

"Ounce of Prevention"

In 1954, as in each of several previous years, the maintenance and body building shops of the Baltimore Transfer Co. have been rated among the best in the country, in the opinion of the American Trucking Association.

The BT-MFX shop is operated on the theory that the best maintenance is *preventive* maintenance. Inspections of mobile units, planning of the shop work—even the policy of stocking some $75,000 worth of spare parts, accessories and maintenance tools—are all keyed to that "ounce of prevention" principle.

In its body-building program, the BT-MFX System works extensively with aluminum. The welders also did a big job in the early days of the all-aluminum trailer.

Back in the early 1930's, Milo Dean, then a young engineer with Aluminum Co. of America, tried to get trailer manufacturing companies and truckers to let him build an all-aluminum trailer on the monocoque-design principle (mutual support by the various parts) used in bridge construction. Baltimore Transfer gave Mr. Dean the "go ahead," and the first aluminum trailer body was cut, bolted and welded together in its body building shop. The new design was a success and changed the course of the motor-carrier industry.

Working with aluminum, steel and iron—and making constant use of our arc-welding equipment as a construction and repair tool—we have been able to keep the freight rolling from city to city and state to state 24 hours a day.

*Superintendent of automotive equipment, Baltimore Transfer Co., Motor Freight Express, Inc. System, Baltimore.

Short of space?

Have your show outdoors

ARE you a distributor with limited indoor facilities? If space is a problem and you want to run a welding show and clinic, you might consider conducting it outdoors during the warmer months.

That's what Virginia Welding Supply Co., Charleston, W. Va., did for its last show. Although some portions of the clinic were held in the warehouse, a good share of it was conducted under tents and lights in the firm's parking lot.

One of the indoor activities was the showing of seven films in the "basement theatre".

The three-evening event was attended by more than 900 persons. Fortunately, the weather was good—only one slight shower marred the event, and that occurred prior to the regular show hours.

VIEW of the grounds showing some of the booths and a portion of the large crowd. Total attendance was over 900

GUESTS were invited to exhibit their skill in this oxyacetylene welding and cutting booth

COMBINED exhibit had one firm's Mig process demonstrated with another's constant-voltage welder

TWELVE manufacturers were represented at the clinic. Here is a grinding-wheel demonstration

No. 602-3-C with #1085
Insulated Steel Glass Holder

No. 706-3-C with #1096
Insulated Dowmetal Lift-Front Glass Holder

FIBRE and FIBERGLAS* HELMETS

Inside view showing INNER BIB of Series "600" Helmets for extra protection to welder's neck from flashes and reflected glare.

New Series "400" Helmets. Smaller size for close quarter work.

*OWENS-CORNING TRADE MARK

Safety and comfort mean *more* welding . . . more production per day! Fibre-Metal engineering has for 50 years kept these "qualities" uppermost in mind . . . for more and better *work ability* by the welder.

Fibre-Metal's Helmets of Fibre *or* Fiberglas* are light, durably resistant to impact and hard use. They feature seamless compression-molded shells, beaded edges for strength and safety, Wide Range Headsize Adjustment, new 4-Position Helmet Stop, and provide for four popular glass holder styles. Adjustable friction joints hold helmet in any position.

Fibre-Metal Features:

LIGHT WEIGHT • EXCEPTIONAL STRENGTH • MOISTUREPROOF
NON-WARPING • HEAT RESISTANT (SELF EXTINGUISHING)
EASILY STERILIZED

When buying any welding equipment . . .
always ask for a FIBRE-METAL product!

FIBRE-METAL
PROFITABLE PROTECTIVE PRODUCTS SINCE 1905

WORKER SAFETY PAYS DIVIDENDS

THE WORLD'S LARGEST MANUFACTURER OF SUPERIOR PROTECTIVE EQUIPMENT

THE FIBRE-METAL PRODUCTS COMPANY
CHESTER, PENNA.

Sold Everywhere thru Leading Distributors and Dealers

VISIT BOOTH 145 . . . A. W. S. WELDING SHOW . . . FOR THE LATEST IN WELDING EQUIPMENT!

Houston is host as . . .

IAA has its convention Texas style — really BIG

BY T. B. JEFFERSON

IN TYPICAL Texas fashion, Houston played host to the International Acetylene Association in a big way.

Three days of technical sessions, which passed much too quickly, laid open a vast storehouse of knowledge for more than 400 members and guests who attended the 55th annual convention of IAA at the Shamrock Hotel March 22-24.

Elected president for the coming year was J. Carl Bode, president of National Carbide Co., a division of Air Reduction Co., Inc., New York City. He succeeds Ernie A. Daniels, vice-president and sales manager of Victor Equipment Co., San Francisco.

Formal activities of the convention began with a luncheon at which three speakers shared the after-dinner spotlight. Mr. Bode, then vice-president of the Association, acted as toastmaster. Members were welcomed to Houston by Mayor Roy F. Hofheinz, who, naturally enough, extolled his constituency.

Mayor Hofheinz said Houston was the richest city per capita in the country, the fastest growing big city, and that it is erecting more large buildings per capita than any other city in the United States.

He missed an excellent opportunity, however, to point out that Houston has more welded-steel structures than any other city in the country, and that three such structures, each more than 15 stories high, are now under construction.

Mr. Daniels, then president of the Association, followed Mayor Hofheinz on the speaker's platform. In his address, he recounted the Association's gains during the past year and described what he thought the future holds for the members. Mr. Daniels also outlined the attitude of the Association in respect to the welding and plastic fields.

Pessimism Also Voiced

The principal speaker at the first day's luncheon was John G. Forrest, business and financial editor of the *New York Times*. Despite the fact that all indexes show we are in a period of the greatest prosperity the country has ever known, Mr. Forrest was somewhat of a prophet of gloom in his forecast for business. He fears that industry will make too many automobiles and build too many homes during the coming year.

Morehead Medal

The outstanding event of every convention of IAA is the Morehead Medal dinner. This year's, held in the Emerald Room of the Shamrock, was no exception. Dr. Augustus Braun Kinzel, director of research for Union Carbide and Carbon Corp., New York City, was the recipient of the 1954 James Turner Morehead Medal. The medal has been awarded annually since 1922 to those who have made outstanding contributions in the acetylene industry.

Dr. Kinzel, affectionately known to his friends as "Gus", has proved to be a tireless worker and an enterprising leader in research activities in the fields of industrial gases, metallurgy and atomic energy. His contributions to industry have been outstanding.

It was he who made priceless contributions to methods for power-cutting and scarfing stainless steels with the oxyacetylene flame. Mathematically, he proved and demonstrated the value of elliptical heads for use on welded pressure vessels.

In the field of metallurgy, his studies of deoxidizing and alloying elements resolved apparently insuperable difficulties in the joining of steel sections by welding. These are only a few of the contributions Dr. Kinzel has made in utilization of acetylene.

His business career was reviewed by two close associates, Dr. Edgar C. Bain, vice-president of research

NEW president of IAA for coming year is J. Carl Bode

FEATURED speaker at opening day luncheon was John G. Forrest

OFFICERS, guest speakers and other dignitaries are shown at the luncheon

and technology, United States Steel Corp., Pittsburgh, and Dr. Cyril Stanley Smith, director of the Institute for Study of Metals, University of Chicago.

While much was said of Dr. Kinzel's contributions to the utilization of acetylene, such an important evening could not pass without comments regarding his past and continuing contributions in the field of atomic energy. These contributions continue to be vital in the vast atomic and nuclear problems of national and international significance.

Educational System Hit

The Morehead Medal was presented to Dr. Kinzel by W. A. Brown, Jr., past president of IAA and president of The Liquid Carbonic Corp., Chicago. In his speech of acceptance, Dr. Kinzel indicated that unless our educational system is changed there probably will not be anyone around to accept the Morehead medal 25 years from now.

To the amazement of many persons present, Dr. Kinzel pointed out that 90% of the high schools in this county have no facilities for teaching physics or chemistry. And in many of the schools where these subjects are taught, they are *not* taught by faculty members trained in the field. The same can be said in the field of mathematics, where few high school students are receiving training in advanced algebra or trigonometry.

He urged members of the Association to do what they can to correct this situation in our school system—a situation that is leaving this country far short of the engineers and scientifically trained personnel it needs.

The technical sessions at Houston were interesting and diversified. Simultaneous technical sessions were held both Tuesday and Wednesday afternoons, with a fifth technical session Wednesday morning. Sessions were devoted to each of the following subjects: piping, marine, safety, oil field equipment, steel production and fabrication.

All of the sessions were of extreme interest to those in the welding field. All subjects discussed pertained to the use of the oxyacetylene flame for joining, severing, or flame-treating metals.

While the marine and oil field equipment sessions naturally attracted those from the immediate Houston area, other persons who may never see an offshore drill rig or the drilling of an oil well, found considerable interest in the application of the oxyacetylene flame in these fields.

Safety

The safety session was particularly good. Everyone in this field is interested in the handling and use of compressed-gas cylinders, protecting the health of welding and cutting operators, and profitable safe practices. And the problems of "piping for oxygen and acetylene" are of continual concern to industry.

Activities on the third day were devoted to the business meeting and a session in which members had a "technical know-how exchange." The luncheon that day was a joint affair with the National Industrial Conference Board at which Malcolm P. Ferguson, president of Bendix Aviation Corp. spoke on new developments of electronics and transportation.

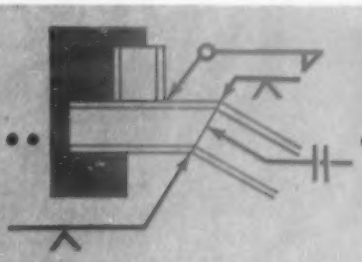
In the afternoon, two members of the accident prevention and health division, Bureau of Mines, U. S. Department of Interior, Dallas, put on a demonstration entitled "The Magic of Fire" in which they dramatically demonstrated how you can be safe in times of fire.

In the 17 years which had lapsed between visits of IAA to Houston, the town has grown and so has attendance at the conventions. When the results were checked it was found that, Texas-style, this had been the biggest IAA convention to date, with more persons attending the annual luncheon and the Morehead Medal dinner than ever before.

The IAA's 55th annual convention was an affair to be long remembered.

MEMBERS and guests mingled at a cocktail party on the first day of the meeting. In center foreground is H. F. Reinhard, IAA secretary

RECEIVING line prior to Morehead Medal dinner. At right is Mrs. A. B. Kinzel greeting J. J. Lincoln. Dr. Kinzel is next to his wife



the welding clinic

Here you may find the solution to your welding problems, whether they concern design, production, construction or maintenance welding. Submit your questions for answering on this page.

Some facts about high-temperature brazing

Question:

What is high-temperature brazing?

Answer:

According to the best accepted definition, high-temperature brazing is a metallurgical joining process in which is used a molten filler metal having a melting point in excess of 1,600 F but below that of the base metal. Diffusion between filler metal and base metal must occur.

What processes are used?

Most high-temperature brazing applications are carried out in furnaces. Generally, a dry hydrogen atmosphere is used.

Various materials are used in high-temperature brazing applications, the most common brazing material being copper. Some of the higher temperature silver alloys, such as silver manganese, are sometimes used in high-temperature applications around 1,000 F.

The materials that are relatively fluid at a temperature range of 1,950 to 2,000 F are for applications that may be subjected to temperatures in the range of 1,800 to 2,000 F. Since copper loses its strength before these temperatures are reached, it should not be considered. Likewise, silver manganese alloys are to be used only at elevated temperatures up to about 1,300 F. Manganese-nickel alloys are good up to about 1,500 F. Therefore, we must look to other brazing materials.

Palladium-silver and palladium-nickel alloys have been used successfully in such applications. The most practical alloys, however, seem to be those of a nickel base with chromium, manganese, silicon and boron as constituents.

Where is it used?

High-temperature brazing is employed to join the high nickel alloys, the stainless steels and other so called "super" alloys used in high-temperature applications. One of the requirements of an alloy used in these applications is that it have high corrosive resistance at elevated temperatures. Lack of this property is one of the faults encountered in using silver alloys or copper for these applications.

A further requirement of high-temperature brazing alloys is that their high-temperature strength closely match the strength of the base metal. One of the reasons boron is used in these alloys is that during brazing the boron diffuses into the base metal, and the alloy's melting temperature rises. As a result, the joint will not become "unbrazed" at the original brazing temperature.

What are some of the applications?

This method of joining metals was primarily developed in connection with jet-engine programs. There are extensive applications of high-temperature brazing in connection with jet-engine components. Two examples: afterburner spray nozzles and gas-engine turbine vanes.

Other aircraft engine applications find high-temperature brazing being used in connection with the joining of aircraft valve seats and aircraft valve bodies. Exhaust manifolds and turbojet starting units are also joined by this process.

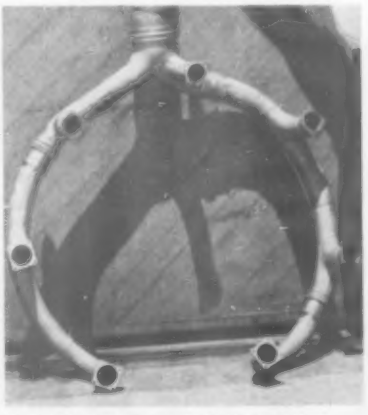
High-temperature brazing is being used in the fabrication of carbide tools for hot machine operations. In the automatic engineering field, high-temperature brazing has found many additional applications, particularly in connection with piping systems and heat exchangers where fused salts or liquid metals are used as a heating medium.

How big is the market?

Any question about the potential market of a relatively new process always leads to some guessing. This method of joining materials has been on the market for a comparatively short time and has found continued new uses.

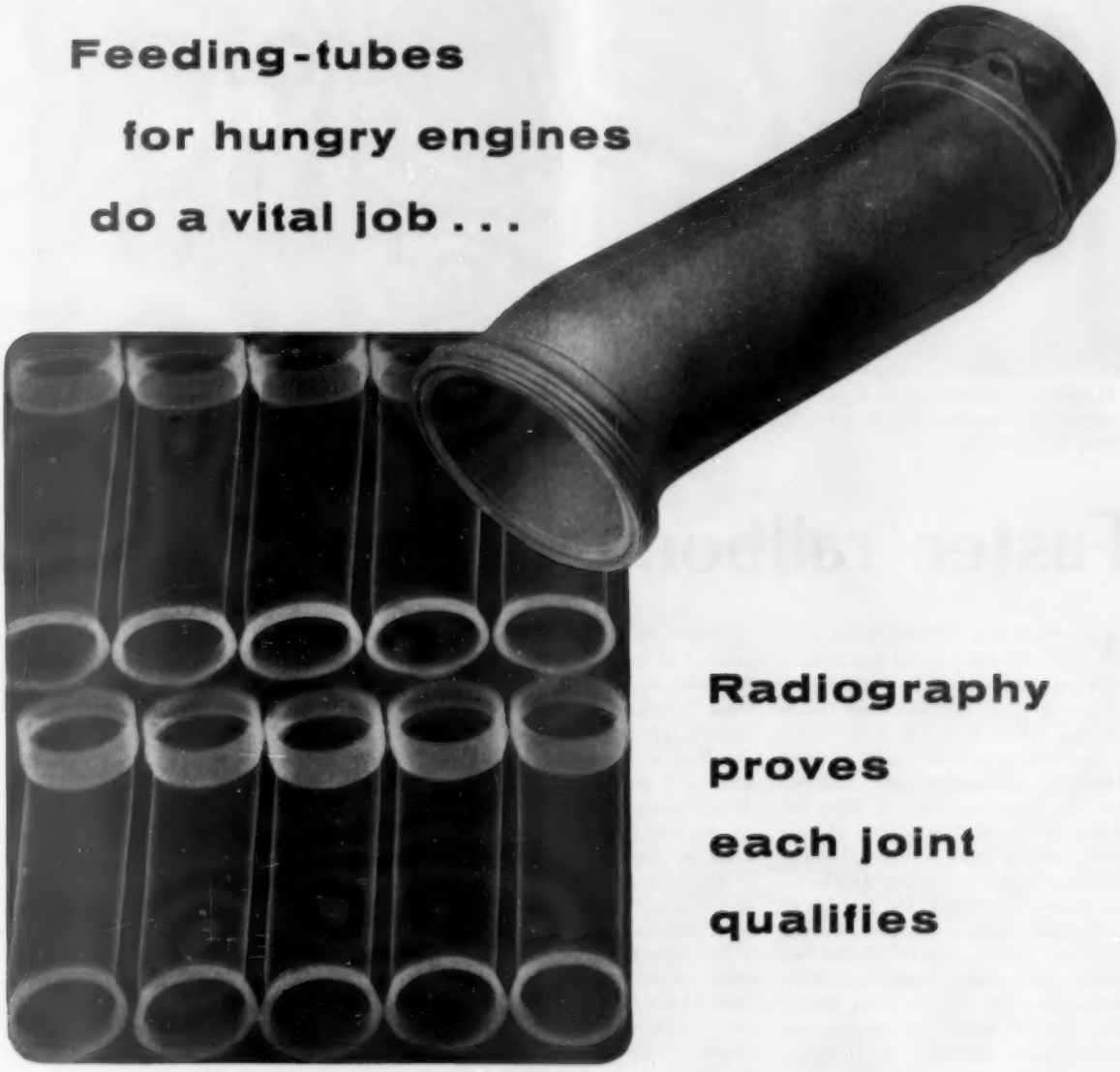
In a nation where the industrial forces are continually working with high-temperature, high-pressure processes, it would look as though the high-temperature brazing field will continue to expand. It will probably find many more uses in the aircraft industry. It will likewise find applications in other high-temperature fields, such as the chemical, food and petroleum processing industries, which are not now using this joining method.

The outlook for high-temperature brazing alloys and their applications seems to be extremely good. But an educational program will no doubt have to be conducted to acquaint many potential users with the possibilities of such applications.



EXHAUST manifolds like this one are often joined by high-temperature brazing

Feeding-tubes for hungry engines do a vital job . . .



Radiography proves each joint qualifies

GETTING the food and drink to the several thousand "metal horses" in a modern aircraft engine is no job to be taken lightly. Dependability is paramount. Safety a must. And lightness a prerequisite.

Joining these vital feed lines is a job for welding and brazing. And with radiography to prove each joint sound, there can be no dispute as to the acceptability of the work.

Here again, radiography has greatly extended the fields where welding can be used. It can bring you new business, too. To explore what radiography can do for you, get in touch with your x-ray dealer and talk it over.

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N.Y.

Radiography

. . . another important example of Photography at Work

Kodak

FLASH of electric arc lasts one second and brazes the signal rail bond to the rail joint. Braze current is 200 amp at 36 volts

WHILE the track crewman in distance grinds sides of joint with electric grinder, near operator brazes the rail bond in position in a few seconds

Faster railbonding

A NEW joining method which literally "flashes" signal bonds onto railroad rails is said to represent one of the biggest improvements made in railbonding in the past 30 years.

The new bond is the result of three years of cooperation and research between American Steel & Wire Division of U. S. Steel Corp., Cleveland; Nelson Stud Welding, Lorain, Ohio; and AGA (Svenska Ab Gasaccumulator) of Stockholm, Sweden.

To train-riding passengers familiar with the "clickety-clack" of the rail joints underwheel, this innovation means less interrupted train travel. The process links rail sections together more securely as electrical conductors and thereby helps eliminate unscheduled train stops due to faulty signal operations.

By this new method, a track crew can install double the number of rail bonds possible with previous methods, according to the manufacturers. Laboratory and railroad field tests indicate that the installations will last the life of the rail, reducing maintenance and replacement needs.

The first order for the new bond has been placed by the Chicago, Rock Island and Pacific Railroad.

No Skill Required

The process permits the 5-in. flexible bronze cable rail bond to be brazed to the side of a rail end in a few seconds. Skilled operators are not required for installation.

This brazing method is claimed to overcome metallurgical difficulties created in normal welding processes. The special gun developed by Nelson Stud Welding delivers a controlled electric arc which generates sufficient heat to form the braze in one second. It avoids high and prolonged temperatures which cause brittleness in the rail itself and in the bronze cable of the bond.

AGA's experience suggested the use of silver solder which lends itself to low-temperature brazing.

Equipment for the bonding operation is mounted on a lightweight cart which rides on the rails or on retractable rubber tire wheels. A single workman can trundle the cart on or off the track in half a minute.

The rail bonds consist of American Steel & Wire's bronze cable with copper lugs on each end. In applying the bond, a special Nelson knock-off rail bond pin and a special ceramic ferrule are used. The pin consists of a silver-solder portion with a small cavity that contains the brazing flux, and the steel portion to which the silver solder cap is applied. The pin is notched just above the silver solder cap permitting it to be knocked off after the lug is brazed to the rail.

Arc Is Shielded

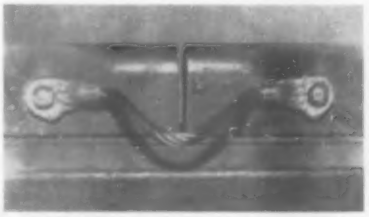
The ferrules, or cone-shaped ceramic collars, are used to shield the arc from the atmosphere and cause the heat to be concentrated in the braze area.

When the gun trigger is depressed, causing the braze current (200 amp at 36 volts) to be struck, it flashes off the tip of the silver solder portion, allowing the flux to cleanse the braze area.

Duration and temperature of the arc are enough to only melt the silver solder. When the brazing current ceases, the steel pin is automatically plunged into the molten pool of silver solder by the gun pushing the solder underneath the copper lug.

This method is said to provide a low resistance electrical connection which will not work loose. The combination of both silver solder and electric arc enables the connection to be made very quickly so that the hard-drawn bronze strands are not affected.

Equipment for fastening the rail bonds includes the gun, batteries, and a small gasoline driven battery charger mounted on the cart.



FINISHED signal rail bond. Both copper lugs of the bond can be brazed to the rail joint in less than a minute—actual brazing takes but a second

Welding cast iron

(Continued from page 48)

color-match the malleable iron. The strength of such repairs is entirely adequate for operational use, and, if color difference is not objectionable, this material may be used to salvage many malleable castings.

Arc-Welding Repair

An electrode recently developed for malleable cast iron has high fluidity and non-cracking properties, which are distinct assets when joining a heat-sensitive metal. It is applied with a technique similar to the machinable electrode described earlier.

The arc is struck upon scrap metal, and, when stabilized, the deposits are flowed onto the parent metal. This is where high fluidity is so essential. The lowest possible heat is necessary. The more fluid the alloy, the easier it is to apply, and heat control is simplified. Skip-welding should be used and beads peened promptly after deposition.

The alloy is a good color match for cast iron, and deposits are fully machinable.

Welding cast iron should present no difficulties to the weldor who will take the time to study the metal and learn to identify it. Each type can be welded, but different welding techniques may have to be used if the desirable properties of the metal are to be retained.

The carbon content and the form in which it is present represent the chief problem.

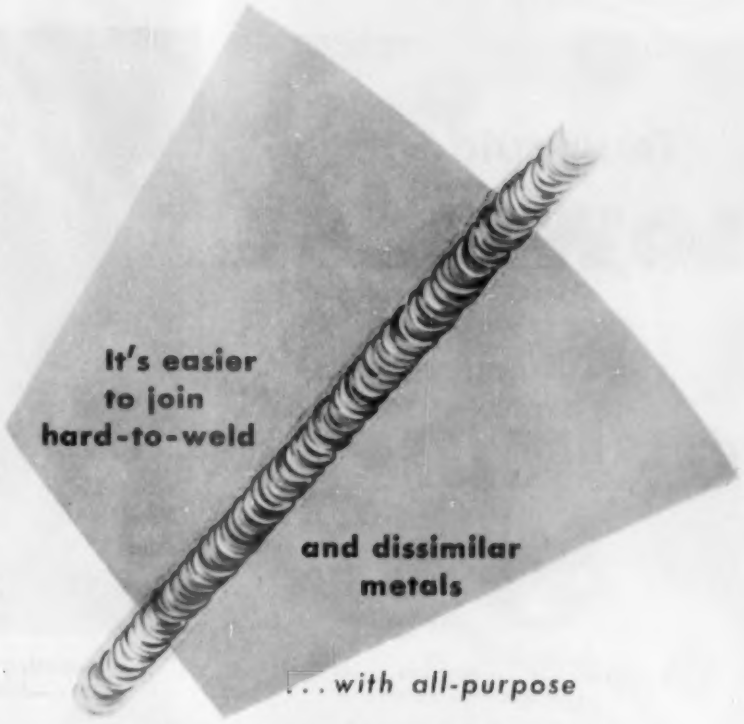
White cast iron contains carbon in the form of iron carbide or cementite. It is hard and brittle.

Grey cast iron is soft and machinable and the carbon is in the form of graphite flakes.

Malleable cast iron is obtained through a long annealing process, and the carbon is in the form of small nodular particles. The metal is stronger, extremely ductile and fully machinable.

Solar forms British firm for gas turbine engines

Solar Aircraft Co., San Diego, has recently formed a British corporation to manufacture and market gas-turbine engines. The new company, known as Sugg Solar Ltd., is jointly owned by Solar and William Sugg & Co. Ltd. The new factory will be located in Crawley, Eng.



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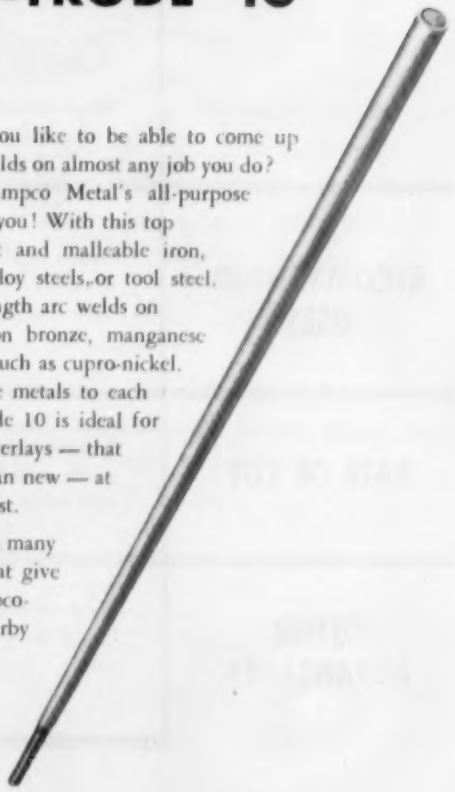
AMPCO-TRODE* 10



How would you like to be able to come up with dense, crack-free welds on almost any job you do? Ampco-Trode 10 — Ampco Metal's all-purpose electrode — does it for you! With this top performer you join cast and malleable iron, galvanized steel, high-alloy steels, or tool steel. You can make high-strength arc welds on aluminum bronze, silicon bronze, manganese bronze, or nickel alloys such as cupro-nickel. You can even join these metals to each other! And Ampco-Trode 10 is ideal for long-wearing bearing overlays — that make old parts better than new — at a fraction of new-part cost.

Get the upper hand on many difficult welding jobs that give you trouble. Order Ampco-Trode 10 from your nearby Ampco distributor or write us.

*Reg. U. S. Pat. Off.

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W-132

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Reducing heavy weld with CARBOFLEX Depressed Center Wheels

	CARBOFLEX Depressed Center Wheels	MX® Depressed Center Wheels	MX® Discs
RECOMMENDED USES	Heavy weld Removal, Portable Cutting-off, Slotting	Light and Medium Weld and Flash Removal, Rough Blending Flat Surfaces	Light Weld and Flash Removal, Blending and Semi-finishing Flat surfaces
RATE OF CUT	Fast on undercutting welds, cutting off and slotting	Fast on welds and flash—medium on flat surfaces	Medium fast on light welds and flat surfaces
OTHER ADVANTAGES	Rigid—strongly reinforced for maximum safety	Slightly flexible—yet strong, safe. Excellent for work on soft metals and alloys	Flexible, yet rigid enough for cleaning channels, interior seams, corner welds

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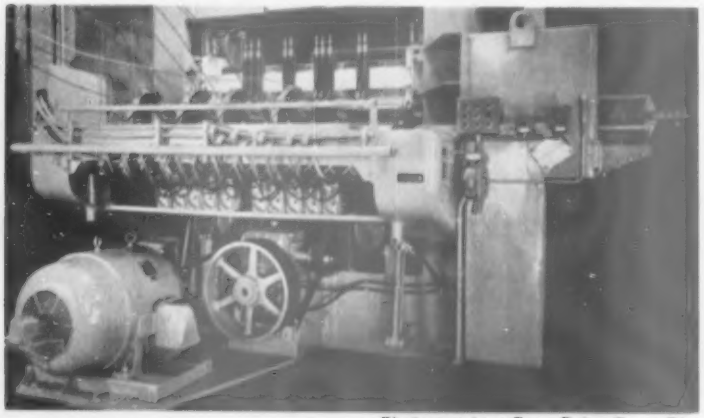
on the job . . .

—Photo courtesy Pandjiris Weldment Co.

WALSH Holyoke Fabricators Division of Continental Copper and Steel Industries, Inc., convert an open field into a welding shop by remote controlled manipulator

—Photo courtesy J. P. Evans

REEL is said to reduce damage to arc welder cable from rough usage and accidental contact with objects encountered when cables are hung on portable arc welding outfits



—Photo courtesy Cone-Drive Gears Div.

WELDER automatically welds wire fed from coiled stock and cuts the formed mat to the proper size. It turns 7 miles of wire per hour into auto seating. Sixteen strands of wire are fed in the front and one strand from the right side to form wire matting, which is welded at each joint. Fifty-hp motor drives speed reducer, which then drives all moving parts of the machine

—Photo courtesy Linde Air Products Co.

HOTPOINT Co. finds automatic Tig (tungsten inert-gas) welding helps cut cost and raise production rate of cooler units, at a rate of one every 24 seconds. In this automatic setup, tubing is welded to the header section in only 4 seconds

—Photo courtesy Bethlehem Steel Co.

FLAT cars can carry two standard trailers of a maximum length of 33 ft. Their heavy design enables the carrying of general freight when not transporting trailers. The underframe is all welded design made of low alloy, high-strength steel.

Minnesota Mining & Mfg. Co.

GLASS-cloth backed tape No. 365 is used as a flux back-up material on a submerged arc welding operation. It can be applied for back-up on operations requiring up to 900 amp, and is most effective for welding plates of ½ in. to 1½ in.

—Photo courtesy Wall Colmonoy Corp.

FARMING turns to industrial techniques as shown by the use of hardfacing on plow shares. Wallex rod is applied to the top face of the point. The welding of a 1/16-in. layer of hardfacing alloy is done by an oxy-acetylene flame.

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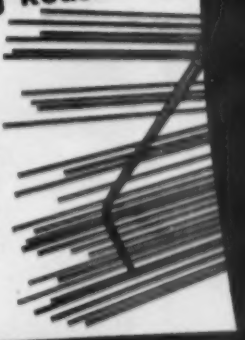

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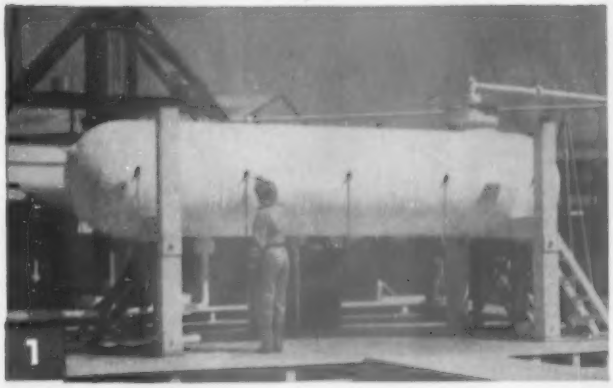
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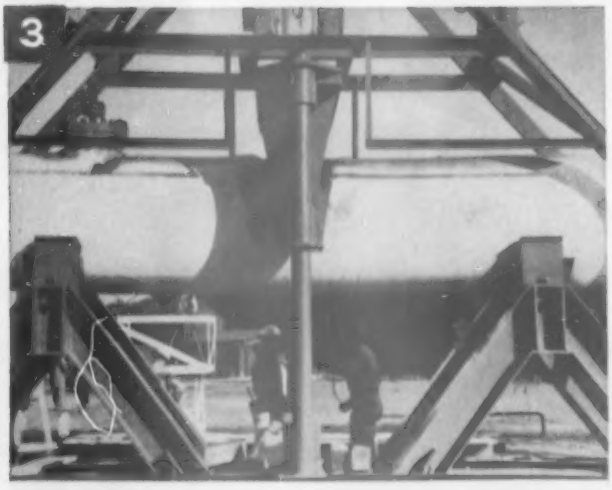
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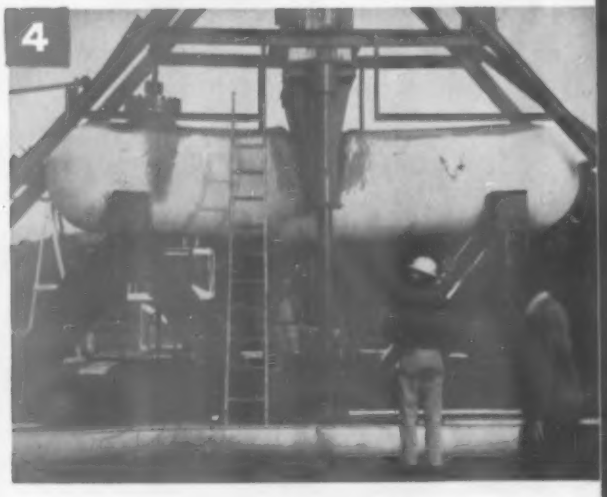
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STAYS TOUGH!

Even at 38° below zero

new USS "T-1" Steel withstands impact of 2,000,000 ft. lbs.

YOU can count on your fingers the few materials that will withstand high impacts at sub-zero temperatures. You have an equally tough time finding more than a handful of materials that will hold up in *high* temperature, high stress applications. But new USS "T-1" Steel does *both* – that's what makes this new engineering material so very remarkable.

"T-1" Steel stays tough and durable at temperatures far below zero, yet remains strong at temperatures as high as 900° F. What's more, you get this unique combination of properties in a steel that is easy to fabricate, that can be welded or flame-cut without pre- or post-heating.

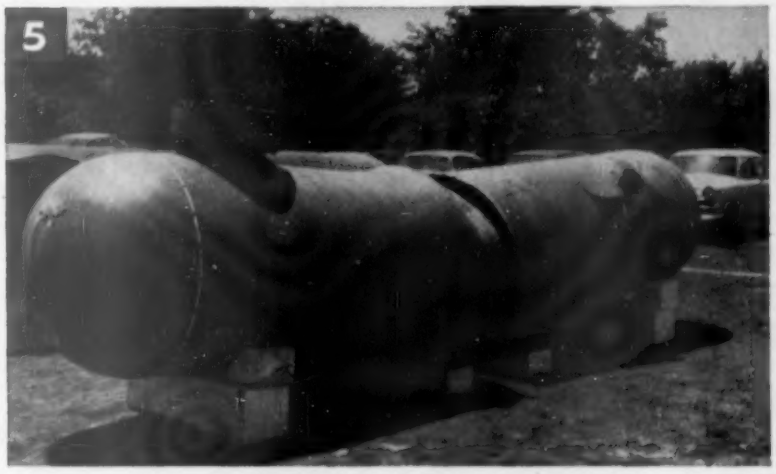
Here is proof of what USS "T-1" Steel can do. Last summer, four-welded pressure vessels made of half-inch "T-1" Steel plate were tested to destruction. Two vessels were stress relieved; two were not stress relieved after welding. Each vessel was refrigerated to temperatures far below zero, then pressurized so that the stress in the steel was 90,000 psi. (Photo #1) That stress alone is enough to rupture the average pressure vessel—it is *five times* normal design strength. But that's only the point at which *testing began* on these "T-1" Steel vessels.

A 13-ton steel ingot was raised high above the vessel . . . then dropped, repeatedly, until the vessel failed. The first drop from 52 feet knocked off the frost (Photo #2), but that's all. The steel and every weld remained intact, and the top of the vessel was barely dented. (Photo #3)

The second drop from 73 feet socked the vessel with an impact of 2,000,000 ft. lbs. at a temperature as low as –38° F. But the blow merely increased the dent another fraction of an inch. The steel held and the vessel was still sound. (Photo #4)

The third and final drop from 101 feet caused failure. With the 13-ton ingot striking at a speed of 55 miles per hour, the steel *had* to give. But it *didn't shatter* or show any sign of brittleness. It stayed tough and ductile. (Photo #5)

As a result of these tests, several major pressure vessel fabricators have requested approval from the ASME to use USS "T-1" Steel in unfired pressure vessels because . . .



HERE'S WHAT USS "T-1" STEEL CAN DO

You can use new USS "T-1" Steel to build larger pressure vessels and storage tanks . . . to use higher allowable working pressures in vessels that weigh no more than present designs.

With no pre- or post-heating required, you can fabricate vessels either in the shop or the field—whichever is more convenient and less costly. Remember, too, when you use the high strength of "T-1" Steel to reduce the thickness of welded sections, you cut welding time and the amount of welding rod needed.

Lighter weight construction with "T-1" Steel reduces shipping, handling, and material costs – and reduces the cost and weight of any foundations and supports that might be needed. Write for complete information.

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LETTERS . . . . *from page 19*

certainly be delighted to assist with more and better articles, more advertising and generally closer coverage of welding developments—now that we know who is the acknowledged leader of the WELDING ENGINEER.

Please accept my heartiest congratulations on your decision and my best wishes for continued professional and business growth.

Very truly yours,
John H. Hruska
Consulting Engineer
Hinsdale, Ill.

* * *

Another well-wisher

Dear Sir:

I have just received a copy of the February issue of your journal, WELDING ENGINEER, in which I notice that you are now not only the editor, but also the publisher.

May I add my congratulations to those of your American friends. I would like to take this opportunity to wish you every possible success. I am sure that as an independent commercial journal, WELDING ENGINEER will continue to enjoy the interest of all its readers and at the same time make an important contribution to modern industrial life by furthering improved techniques and processes which will help to raise the standard of living.

If at any time I can help you with information regarding developments on this side of the Atlantic please do not hesitate to let me know.

With renewed good wishes for the prosperity of your journal, I am,

Yours sincerely,
R. N. Thompson
Editor
Welding and Metal Fabrication
London

* * *

Belated congratulations

Dear Sir:

Sorry to be belated in congratulating you on taking over the WELDING ENGINEER. I wish you all the success in the world and anticipate just that. The WELDING ENGINEER has long been synonymous with Ted Jefferson to all who knew you, so that it is just fine that one of welding's best spokesmen is on his own.

Sincerely yours,
H. W. Pierce
President
New York Shipbuilding Corp.
Camden, N. J.

Make faster, stronger welds with

Bridgeport No. 192 Low Fuming Bronze Rod

When this cast iron bearing pedestal cracked open, its 250 hp motor and a 4200 psi extrusion press pump had to shut down in a hurry. A new pedestal meant a delivery wait plus a lot of heavy work, while a full production schedule called for immediate repair.

Within a matter of hours, braze welding with Bridgeport No. 192 Low Fuming Bronze Rod had this crucial unit back on the line. The job was done quickly, completely, and on the spot, without moving a single piece of heavy equipment. Later inspection showed the braze welded crack to be stronger and less brittle than the original pedestal casting.

Braze welding requires no long preheating or cooling, is recommended for building up worn surfaces and regular production of fabricated parts as well as casting repair. Bridgeport's folder "Bronze Welding," offers valuable information on the subject. Write for your copy today.

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Determining need for preheating

BY W. E. PALMER

THE requirement for preheating of a given material as an advisory procedure before attempting to weld it is usually explained by the manufacturer of the electrode to be used, or by the manufacturer of the material to be welded. However, each individual case cannot always be considered, as an assembly of dissimilar metals may bring about a problem, or the information may not be available when it is most needed. Particularly is this so on welding of alloy steels.

The following data consists of a practical procedure which can be used to determine the need for preheating before welding. It assumes only that the user knows the analysis of the steel he is to weld. Such information is common knowledge or is obtainable from the supplier of the base metal. It has been used by the writer for many years, and, so far as results are concerned, has worked out very well.

First, adopt the following table or key which is devised on the basis of comparative hardnesses of each element as compared with carbon:

ELEMENT	CONSTANT
Carbon	**1**
Phosphorus	**2**
Chromium	**5**
Vanadium	**5**
Manganese	**6**
Molybdenum	**4**
Nickel	**15**
Copper (above 0.5% content)	**13**
Cobalt	**150**

Silicon and sulphur content of steel have no influence and are therefore ignored. The table above should be retained, and from it the need for preheating is obtained in the following manner:

Example—Should a steel of the following analysis be preheated before welding is attempted? (Figures are in percentages).

C	**0.22**
P	**0.02**
Cr	**0.50**
V	**0.10**
Mn	**0.45**
Mo	**0.20**
Ni	**3.0**
Si	**0.11**
S	**0.03**

As stated before, carbon is the criterion against which all the other ingredients are compared.

The next step: divide each of the other ingredients in the table by its "constant" figure shown in the second column. This will result in the following:

Carbon	**0.22%**	÷	**1**	**= 0.220%**
Phosphorus	**0.02**	÷	**2**	**= 0.010**
Manganese	**0.45**	÷	**6**	**= 0.075**
Chromium	**0.50**	÷	**5**	**= 0.100**
Nickel	**3.0**	÷	**15**	**= 0.200**
Molybdenum	**0.20**	÷	**4**	**= 0.050**
Vanadium	**0.10**	÷	**5**	**= 0.020**
				0.675%

As previously stated, the silicon and sulphur contents are ignored.

The 0.675% total represents the hardenability of the steel as compared with the hardness of carbon. If the total is greater than 0.32% then preheating is indicated.

Looking at it another way, the total shown (0.675%) is equivalent to the hardness of the same amount of carbon in the steel and obviously indicates preheating before welding.

It is not uncommon to weld a steel with a carbon equivalent of 0.52% without preheating when larger diameters of electrodes, which impose a higher heat input in welding, are used. However, there is no guarantee that cracking will not result in this case; therefore, preheating would guarantee a better result.

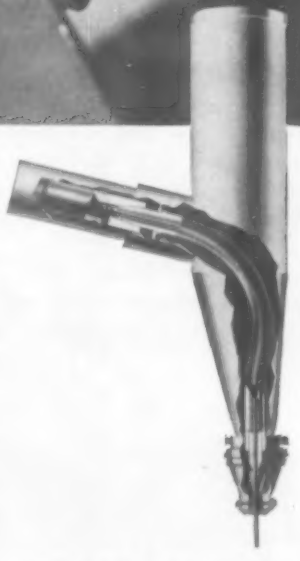
If it is not possible to preheat the base metal, use a larger diameter electrode to induce heat input by way of controlling hardening that occurs in the heat-disturbed areas of the plate. The higher the heat input, the slower the rate of cooling. This puts some control within the weldor's manipulations.

As heavier plate conducts heat faster than thin plate, different results can be obtained. To avoid this and to make the operation more uniform, a preheat can be used.

Best uniformity is, of course, obtained with preheating.

Increase hardfacing production

Constant arc length regardless of operator movement or surface roughness.



HOW THE AMSCO MF WORKS

Bare mild steel electrode continuously feeds through the welding cone. It is magnetically coated with flux of your choice—manganese steel build-up or hardfacing alloy—at the point of the cone. Electrode feed is automatically regulated so that a constant arc length is maintained. Full coil lengths of electrode are consumed, with no loss of stub ends.

automatically...with the

NEW AMSCO® MF WELDER

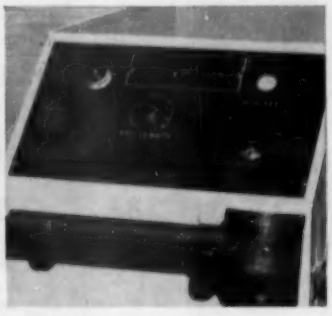
You steer the cone...the Amsco MF does the work. You lay down more metal in less time, because this welder uses a small diameter electrode and high current densities, which allow a high deposit rate without tiring the operator.

Electrode feed is continuous, and automatically regulated to maintain a constant arc length. This assures a more uniform bead by compensating for operator hand movement and irregular welding surfaces.

Welding is by open arc so you can see what you're doing. The Amsco MF is portable. It plugs into any standard welding unit. It requires no special setup.

See a demonstration of the Amsco MF —its speed, quality of weld and uniform deposit. See how easy it is to operate. Try it and you'll think of many more reasons why it will save hardfacing time and labor costs. Your Amsco Distributor is ready to show it to you now.

Flux held in cone contains the welding alloy you require.



Easily identified, easy to operate panel controls.

Uses small diameter, coiled, bare mild steel electrode.

VISIT US AT BOOTH 259

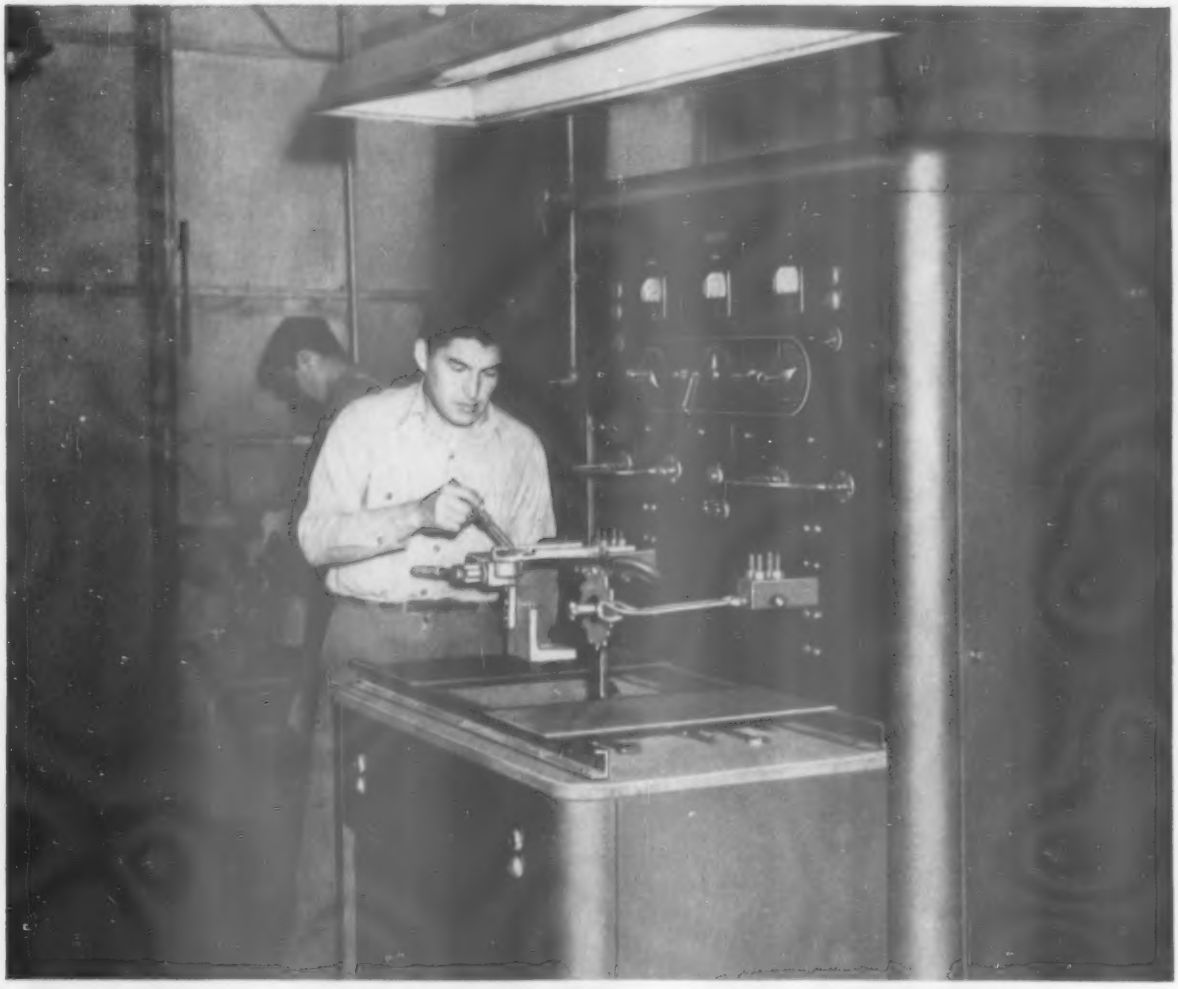
WELDING SHOW

MUNICIPAL AUDITORIUM
Kansas City, June 8-10

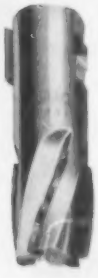
MAKE YOUR AMSCO DISTRIBUTOR HARDFACING HEADQUARTERS

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois



LINDBERG INDUCTION UNIT REDUCES BRAZING COSTS BY 50%



It happened in Hawthorne, California, at the Sonnet Tool and Mfg. Co., manufacturers of HELICARB Helical Carbide Cutting Tools. After installing a Lindberg 25 KW induction unit, average brazing time required for a production run of tools was tremendously reduced, resulting in substantial production economies. At the same time, product uniformity was far superior to that achieved by the previous method.

In addition to the obvious dollars and cents savings in time, labor and brazing materials, the Lindberg unit is cleaner and allows more comfortable operating conditions, according to Sonnet.

Lindberg engineers will gladly provide you with information on equipment relating to your application. See your nearest Lindberg field representative, or write for bulletin 1441.

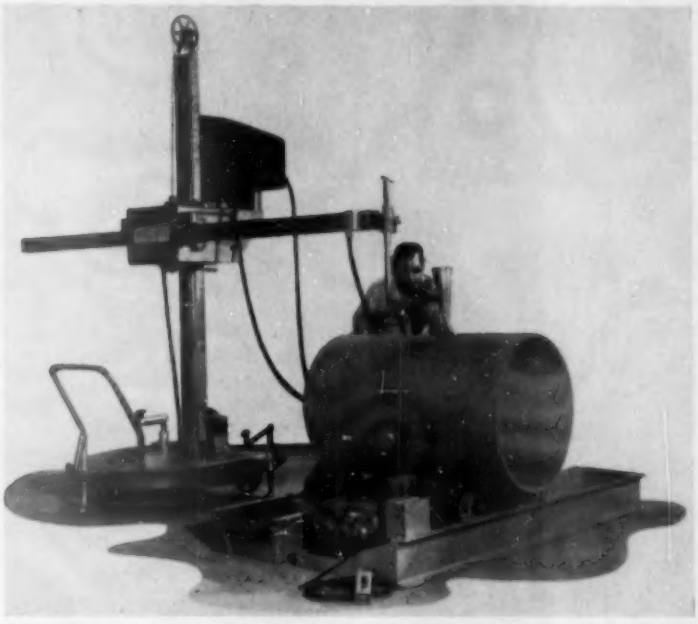
Left to right: MERLE HILLIARD, *Vice President and General Manager*; E. C. "BUD" SUNDERMAN, *Shop Superintendent*; PAUL SAXMAN, *Chief Engineer*

Shop Superintendent, E. C. "Bud" Sunderman says: "One of the wisest investments we ever made was in our Lindberg induction unit. It has opened up new fields of carbide tooling, and has improved manufacturing procedures."

LINDBERG *HIGH FREQUENCY DIVISION*

Lindberg Engineering Company • 2477 West Hubbard St., Chicago 12, Illinois

new products . . . . . USE CARD ON PAGE 107



SEMI-automatic manipulator now has boom and controls cabinet mounted on single column

WELDER can be used on a-c or d-c current by flipping switch

Manipulator

IMPROVED semi-automatic manipulator is now said to be more compact and heavier. The boom and controls cabinet are mounted on a single column as compared to the original double column arrangement.

The base now is semicircular in design and has three jacks for raising the entire unit clear of the floor. Three wheels, one a swivel-type, make it fully portable. A micrometer screw adjustment permits raising and lowering the head by hand, turning it to a 45 deg angle for fillet welding and guiding it along irregular seams.

"SAM" is available with either hand or power lift. Horizontal and vertical arcs can reach 8 ft. Welding speeds from 0 to 120 ipm are possible. *Pandjiris Weldment Co.*

Circle No. 50.

• • •

Electrodes

SYSTEM of arc welding which reduces the need for preheating and heat treatment subsequent to welding uses a group of chromium-moly electrodes called "Croloy." Weld deposits have stress-rupture characteristics over a wide range of temperatures, along with ductilities and resistance to corrosion and oxidation.

The group includes four individual low hydrogen electrodes depositing metal of the following analyses: "Croloy 1A," Cr 1.00-1.25%-Mo .40-.60%; "Croloy 2A," Cr 1.80-2.20%-Mo .40-60%; "Croloy 2¼A," Cr 2.00-2.50%- Mo .90-1.10%; "Croloy 5A," Cr .40-.60%-Mo .40-.60%.

The system can be used in the welding of power piping and the fabrication of high pressure boilers, petroleum refinery equipment and chemical processing plant equipment. *Metal & Thermit Corp.*

Circle No. 51.

• • •

Water saver

SEVERAL major changes in model "ET101 Water Mizer" include enlarged bypass port, adjustable thermostat and a neon pilot light assembly.

The complete self-contained unit, 6½ in. high by 5½ in. wide by 8½ in. long, is said to save water on all water-using parts of the resistance welder—up to 90% savings. It reduces condensation and electrical failures, and cuts down on lime deposits. *Van Vooren Products.*

Circle No. 52.

A-c, d-c welder

TWO welders that can be used with a-c or d-c current by the flip of a switch are designated the "DA-200HF-GW" for 200 amp and the "DA-300HF-GW" for 300 amp.

The manufacturer claims each machine is adaptable to seven different welding processes—metallic arc, a-c or d-c; inert-gas, a-c or d-c; automatic inert-gas; mig (metal inert-gas) and spot.

The units are also said to feature a dial-electric control which enables the operator to get heat adjustment throughout the entire range, and also an adjustable time-delay control which keeps gas and water flowing for a predetermined time after the arc is broken during inert-gas processes. *Harnischfeger Corp.*

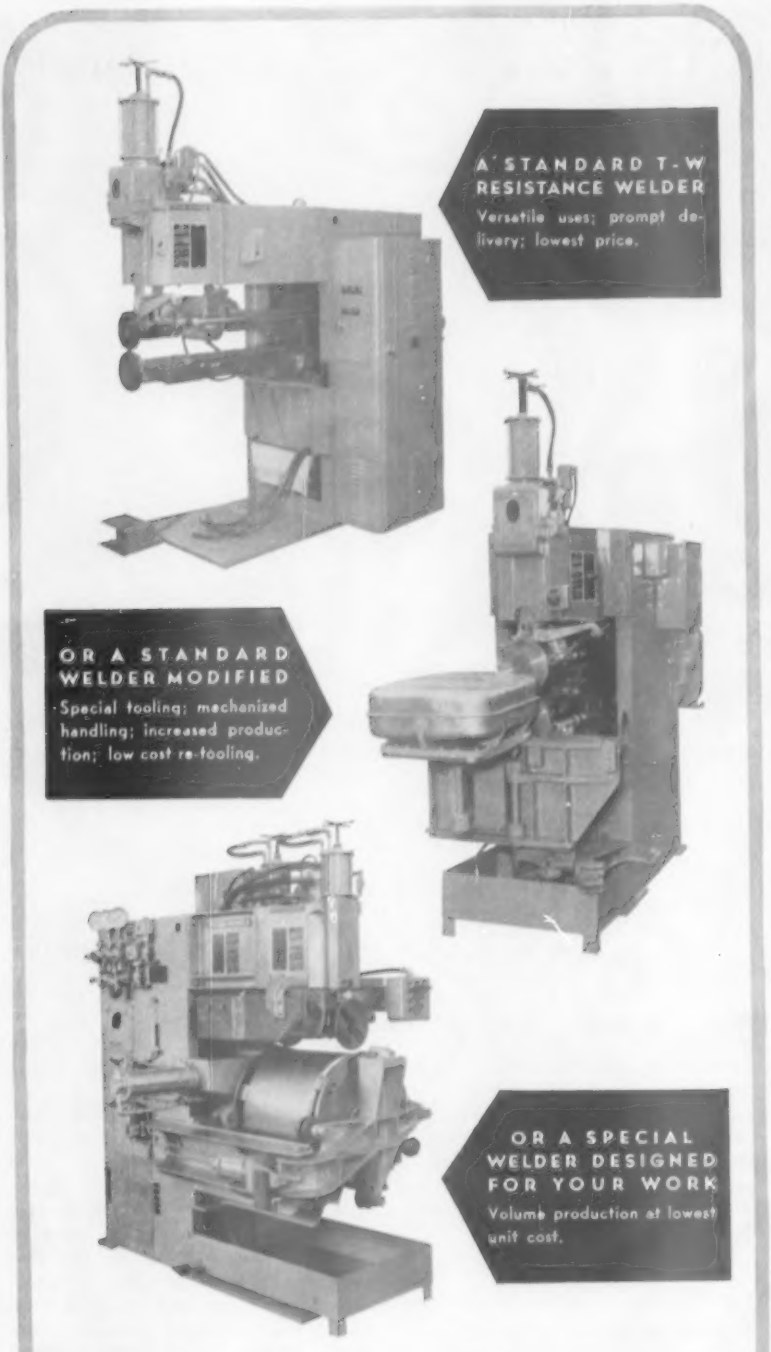
Circle No. 53.

• • •

Industrial curtains

"DURATEX" utility curtains that remove fire dangers consist of a fabric base woven of fiberglas or nylon yarn coated with synthetic plastic resins. Because of its fireproof feature, the curtains are used for welding protection. *Duracote Corp.*

Circle No. 54.


A STANDARD T-W RESISTANCE WELDER
Versatile uses; prompt delivery; lowest price.
OR A STANDARD WELDER MODIFIED
Special tooling; mechanized handling; increased production; low cost re-tooling.
OR A SPECIAL WELDER DESIGNED FOR YOUR WORK
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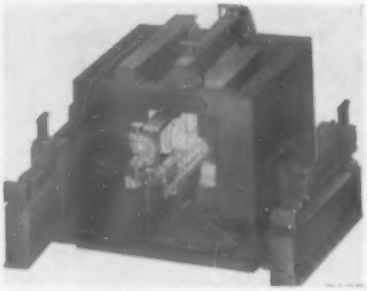


Shear weld trimmer

MODEL "RB" shear weld trimmer is designed for joining the ends of coils in continuous process lines. This equipment is useful in galvanizing, pickling, annealing and slitting lines.

The following are contained in one single unit: entry and exit pinch rolls, entry and exit strip centering devices, transfer carriage with independent clamp jaws, double blade-up cut shear and die set, welder-trimmer unit, roller lift and roller hold-down devices. *Morton Mfg. Co.*

Circle No. 55.

* * *

Sealer

METAL oxide type sealer has a short sealing reaction time for impregnating all types of metal castings, according to the manufacturer. It can be used with all types of welding alloys to penetrate welded joints of fabricated parts. *Prenco Products, Inc.*

Circle No. 56.

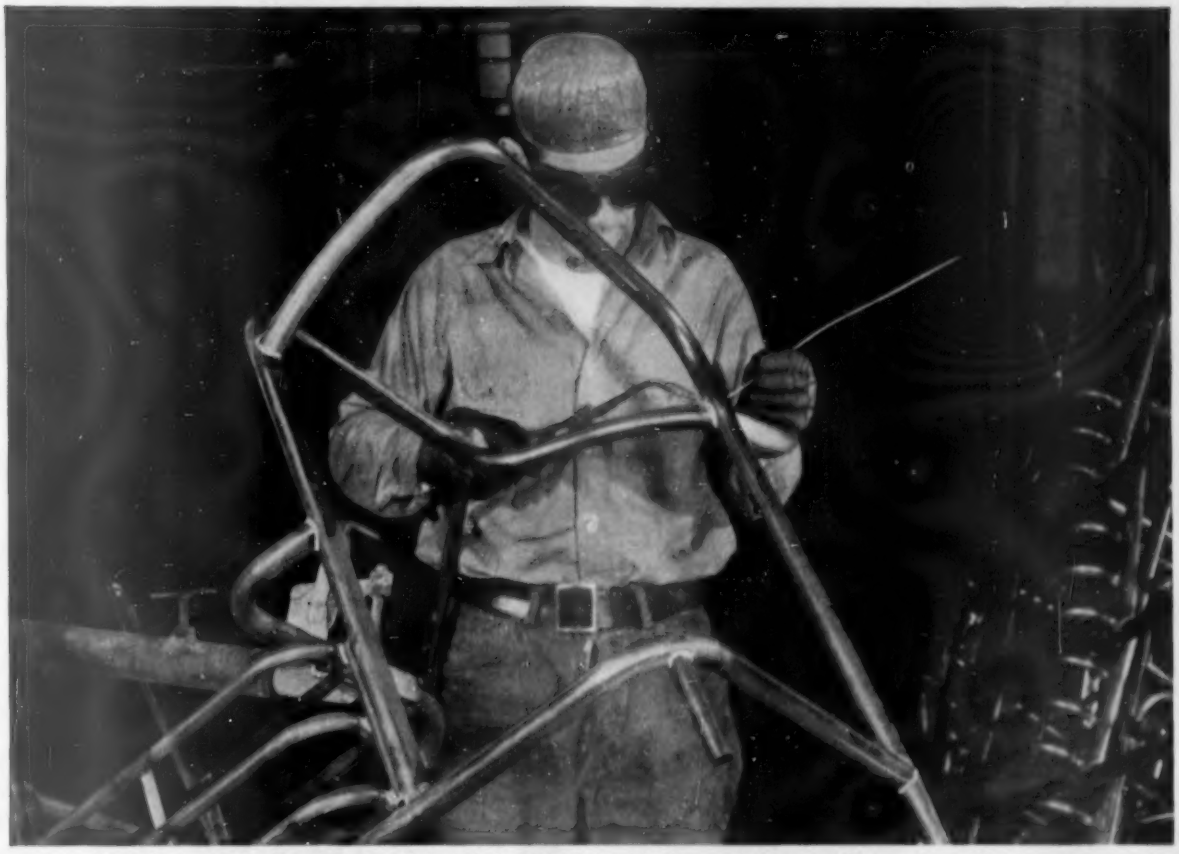
* * *

Center-finder

MODEL "PF" center-finder enables layout men to mark four equi-distant points on the circumference of a pipe of any size at any degree at the same time.

It has a 0-90-0 deg scale and a double reading of ½ in. per-ft pitch scale. All the calibrations are etched on stainless steel. The center-finder is 6 in. by 3⅞ in. by 1⅜ in. and weighs about 17 oz. It is individually machined, ground and finished and made of high-grade alloy. *Interstate Sales Co.*

Circle No. 57.



A revolving fixture holds this tubular steel chair-desk while the weldor brazes the joints with ANACONDA-997 (Low Fuming) Bronze Welding Rod. Heywood-Wakefield Company began producing welded steel tubing back in 1910. Today, they are leading manufacturers of tubular steel schoolroom furniture, bus, subway, railway car and theater seating.

here's production speed . . .

23 braze welds in 17 minutes

Here's the finished chair with seat, back rest and desk sections in place.

They know a lot about the techniques of production welding at Heywood-Wakefield Company, Gardner, Mass. Take the combination school chair-desk you see here. First it's tack-welded by semi-automatic resistance welding. Then it goes into a revolving fixture for braze welding with ANACONDA-997 (Low Fuming) Bronze Welding Rod and the flame-fluxed oxyacetylene process. The weldor swings the assembly to reach all joints from one position, completing the 23 welds in an average time of 17 minutes.

It's not only a fast job . . . it's a *good* job. The credit goes to Heywood-Wakefield engineers for their time-saving fixtures; to the weldor for his skill, and to the ANACONDA-997 rods he uses. Heywood-Wakefield prefers these rods because the finished welds are very strong, and they don't require special cleaning before painting. They're degreased, wire brushed . . . then painted. That's all.

ANACONDA-997 (Low Fuming) Bronze is a superior welding rod used to join copper alloys, cast iron, malleable iron and steel by the oxyacetylene process. It is also used for repair welding, and to deposit bearing surfaces on steel and iron. You can get other ANACONDA Copper Alloy Welding Rods for many different repair and production welding purposes. They're sold by distributors of welding equipment everywhere. Anaconda distributors are also a good source of practical advice on welding problems. Pratt & Inman Company, Worcester, Mass., general distributors, furnish Heywood-Wakefield Company with ANACONDA-997 Welding Rods. For more information about ANACONDA Welding Rods and recommended welding procedures, write for a copy of Publication B-13. Address *The American Brass Company, Waterbury 20, Conn.* In Canada: *Anaconda American Brass Ltd., New Toronto, Ontario.* 6518B

ANACONDA®

WELDING RODS

Q. What controls the quality of consumable electrode welding?

A. One big factor is the quality of the electrode used.

Q. How can you be sure of getting the best electrode?

A. By insisting on Alcoa's new I.G.* Electrode.

Q. Why?

A. Every production lot of Alcoa® I.G. Electrode is test welded and the welds X-rayed for soundness. Each 10-lb spool is individually packed to maintain the super-smooth finish to assure soundness of weld and smoothness of feed. Each of five alloys, 1100, 4043, 5154, 5254 and 5356 (formerly 2S, 43S, A54S, B54S and XC56S), is available in six diameters. There is no better electrode.

*inert gas

Your guide to aluminum value

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ALUMINUM COMPANY OF AMERICA

A new, 176-page text, *Welding Alcoa Aluminum*, has just been released by Alcoa. It covers every phase of welding in complete detail. For a free copy, fill in and mail the coupon.

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Pittsburgh 19, Pa.

Gentlemen: Please send book, *Welding Alcoa Aluminum*.

Name _____

Company _____

Title _____

Address _____ City _____ State _____

Q. Where is Alcoa's new I.G. Electrode available?

A. Contact your nearest Alcoa sales office, or, for immediate delivery, call one of the Alcoa Distributors listed below. He carries a complete range of alloys and sizes, and you'll find him well qualified to work with your welding experts.

ALBANY, N. Y.
†Eastern Brace-Mueller-Huntley, Inc.

ATLANTA, GA.
†J. M. Tull Metal & Supply Co., Inc.

BALTIMORE, MD.
Whitehead Metal Products Co., Inc.

BIRMINGHAM, ALA.
†Hinkle Supply Co.

BOISE, IDAHO
Pacific Metal Co.

BUFFALO, N. Y.
Brace-Mueller-Huntley, Inc.
Whitehead Metal Products Co., Inc.

CAMBRIDGE, MASS.
Whitehead Metal Products Co., Inc.

CHARLOTTE, N. C.
Edgcomb Steel Co.

CHICAGO, ILL.
†Central Steel & Wire Company
†Steel Sales Corporation
Corey Steel Co.

CINCINNATI, OHIO
Williams & Co., Inc.

CLEVELAND, OHIO.
†The Hamilton Steel Co.
Williams & Co., Inc.

COLUMBUS, OHIO
Williams & Co., Inc.

DALLAS, TEXAS
Metal Goods Corp.

DENVER, COLO.
Marsh Steel Corp.
Metal Goods Corp.

DETROIT, MICH.
Central Steel & Wire Co.
Steel Sales Co. of Mich.

HARRISON, N. J.
Whitehead Metal Products Co., Inc.

HILLSIDE, N. J.
Miller Steel Co.

HOUSTON, TEXAS
Metal Goods Corp.

INDIANAPOLIS, IND.
Steel Sales Co. of Indiana, Inc.

JACKSONVILLE, FLA.
Florida Metals, Inc.

KANSAS CITY, NORTH, MO.
†Marsh Steel Corp.
Metal Goods Corp.

KENILWORTH, N. J.
Kenilworth Steel Co.

LOS ANGELES, CALIF.
†Ducommun Metals & Supply Co.
Pacific Metals Co., Ltd.

LOUISVILLE, KY.
Williams & Co., Inc.

MIAMI, FLA.
Florida Metals, Inc.

MILFORD, CONN.
†Edgcomb Steel of New England, Inc.

MILWAUKEE, WIS.
Central Steel & Wire Co.
Steel Sales Co. of Wis.

MINNEAPOLIS, MINN.
Steel Sales Co. of Minnesota

NASHUA, N. H.
Edgcomb Steel of New England, Inc.

NEW ORLEANS, LA.
Metal Goods Corp.

NEW YORK, N. Y.
Adam Metal Supply Co., Inc.
Eastern Brass & Copper Co.
Manhattan Brass & Copper Co.
Strahs Aluminum Co.
†Whitehead Metal Products Co., Inc.

PHILADELPHIA, PA.
†Edgcomb Steel Co.
Whitehead Metal Products Co., Inc.

PITTSBURGH, PA.
†Williams & Co., Inc.

PORTLAND, ORE.
†Pacific Metal Co.

ROCHESTER, N. Y.
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†Metal Goods Corp.

SALT LAKE CITY, UTAH
Pacific Metals Co., Ltd.

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Whitehead Metal Products Co., Inc.

TAMPA, FLA.
†Florida Metals, Inc.

TOLEDO, OHIO
Williams & Co., Inc.

TULSA, OKLA.
Metal Goods Corp.

YORK, PA.
Edgcomb Steel Co.

†Home Office

Electrode

"PBEX" high strength electrode is reported excellent for electric brazing of copper alloys and joining ferrous metals to copper alloys, and for cast iron, steel and all bronze welding. The manufacturer says it eliminates pitting, porosity and the general "sponge like" effects of conventional bronze welds.

It comes in sizes 3/32, 1/8, 5/32 and 3/16. Standard package is 50 lb. *Perma-Latem Welding Alloys Inc.*

Circle No. 58.

* * *

Oxyacetylene torches

FOUR oxyacetylene torches known as the heavy duty "Super-jet", the medium duty "Star-jet", the light duty "Aero-jet" and the automatic light duty "Jet-o-matic" are reported to have greater ease of operation and reliability.

The torches feature aluminum handle construction which lowers torch weight; stainless-steel torch head which keeps handles cool; precision ground, stainless-steel needle valves with spring loaded telescoping valve heads and welding tips and cutting assemblies. *Marquette Mfg. Co., Inc.*

Circle No. 59.

* * *

Rectifiers

SILICON power rectifiers are said to have an efficiency of about 99 per cent and an ability to operate in extremely high ambient temperatures. It is about 1/8 cu in. in size, weighs 0.1 oz, is of all-welded construction and it is hermetically sealed.

The manufacturer states these rectifiers have performed continuously without deterioration at temperatures up to 200 C, and repeated cycling from —40 C to 125 C shows no appreciable effect. *Bogue Electric Mfg. Co.*

Circle No. 60.

For more information use card on page 107

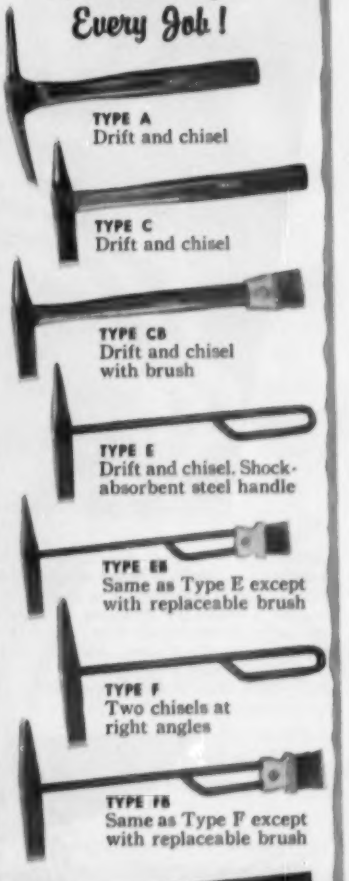
CMD CHIPPING HAMMERS

HELP YOU DO A BETTER JOB

Your men do their *best* work when they have the *best* tools to work with. CMD chipping hammers *are* the best, the longest lasting, the most satisfactory in every way. See that *you* get and use the best. Get CMD today!

A COMPLETE LINE

A Hammer for Every Job!



TYPE A
Drift and chisel

TYPE C
Drift and chisel

TYPE CB
Drift and chisel with brush

TYPE E
Drift and chisel. Shock-absorbent steel handle

TYPE EB
Same as Type E except with replaceable brush

TYPE F
Two chisels at right angles

TYPE FB
Same as Type F except with replaceable brush

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use NEW Bronze-Arc C

PHOSPHOR BRONZE ELECTRODES

Another "first of its kind" development of Alloy Rods Company research brings an entirely new phosphor bronze electrode—Bronze-Arc C. Incorporating a unique low hydrogen type coating, Bronze-Arc C electrodes have demonstrated advantages . . . porosity-free deposits, all-position welding, smooth easy flowing arc characteristics, easy slag removal and outstanding physical properties.

Typical Physical Properties of Bronze-Arc C Electrodes

Tensile Strength p.s.i.	58,000 to 65,000
Yield Strength p.s.i.	30,000 to 37,000
% Elongation in 2" ga.	42% to 48%
Hardness, Rockwell B	72 to 78
Face Bend	180°
Root Bend	180°

Bronze-Arc C conforms to A.W.S.—A.S.T.M. Specification No. B-225-53T, Classification E CuSn-C.

Write today for complete information on new Bronze-Arc C electrodes—the electrodes designed especially for high strength, X-Ray quality welds.

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at WELDING SHOW
MUNICIPAL AUDITORIUM
Kansas City, June 8-10, '55

Alloy Rods Co.

General Offices and Plant • York 2, Pa.
Pacific Coast Sales Office and Plant
El Segundo, Calif.

no finer electrodes made . . . anywhere

Positioner

A 10 cwt capacity "rotilting" positioner, model "10HH/A" has self-aligning cylinder rotators of two ton capacity.

The manufacturer claims the self-aligning cylinder rotators is the first machine to be produced for rotating cylinders with diameters from 4½ in. to 6 ft without any adjustments being necessary, and it ensures a considerable time-saving wherever circumferential welds are required on varying sizes of boilers, pipes and other cylindrical vessels. *F. Bode & Son Ltd.*

Circle No. 61.

* * *

Sound barrier curtain

"TRANSWALL," a lightweight, retractable sound barrier curtain designed for industrial applications, is made of a flame-resistive and sound-reflecting material known as "Bemisorb," a specially treated and coated burlap. *Bemis Bro. Bag Corp.*

Circle No. 62.

* * *

Clamping device

"CLAMPCUT" is the name for a new milling machine vise and milling cutter. According to the manufacturer it combines easy handling and the "down-clamping" feature. *J & S Tool Co., Inc.*

Circle No. 63.

Bar clamp

"QUICKCET" bar clamp is designed to hold small or large objects that used to be too bulky to handle. This ¾ in. clamp has a sliding jaw that can be adjusted vertically or horizontally.

Made of alloy steel, this clamp is said to have been tested to 4,500 lb. It weighs 8 lb and has a 15 in. opening capacity with its standard 12 in. pipe bar, but extra bar extensions of any length can be furnished. *Grand Specialties Co.*

Circle No. 64.

* * *

Crescent valve

SUB-base mounted crescent valve can be replaced in a matter of seconds by loosening three holding clamp bolts. The sub base remains undisturbed as a permanent part of the piping.

The pilot - operated, solenoid - controlled four-way valves are for air, light oil and water pressures to 150 psi. *Barksdale Valves.*

Circle No. 65.

* * *

Fluxless soldering

THIRD type of "Sonobond" unit in the line of ultrasonic equipment for fluxless soldering of aluminum, copper, brass and silver is model "S-1-H-54-12." It is a small hand unit with a soldering head of 8 in. and a weight of 10 oz. Heating need is supplied by a 600-watt platen.

Other models were an intermediate-size hand unit and a floor-stand type. *Aeroprojects Inc.*

Circle No. 66.

For more information use card on page 107

From any angle...

YOUR BEST ELECTRODE

ATOM-ARC

The ONLY All-Position Iron Powder Low Hydrogen Electrode

- X-ray quality weld metal
- No starting porosity
- More pounds of weld metal per electrode used
- Outstanding physical properties
- Smooth, uniform weld bead in all positions
- No moisture pick up

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Kansas City, June 8-10, '55

Get the complete story now...
Write today for your copy of the ATOM • ARC Bulletin—it tells you what you want to know about this revolutionary new electrode.

Alloy Rods Co.

General Offices and Plant • York 2, Penna.
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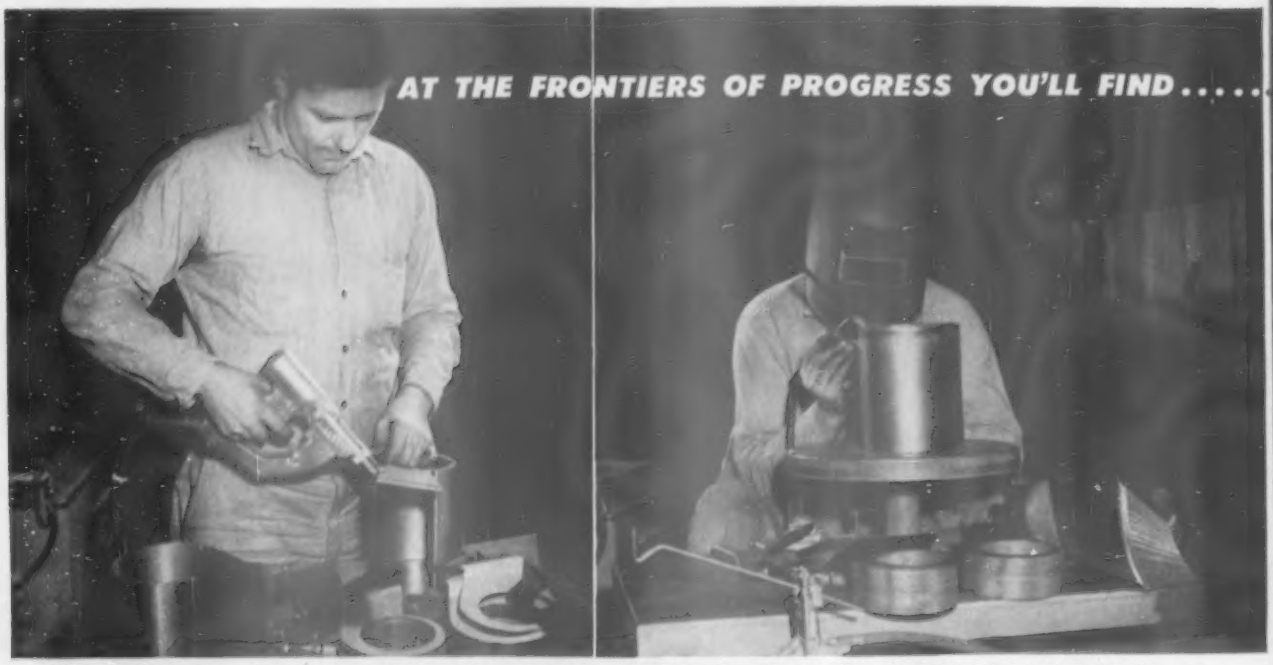
no finer electrodes made . . . anywhere



STEP 1. Using an Aircospot gun, (which takes one second to make a strong, sound spot weld), the Falstrom operator tack-welds flange on a metal cover. An average of 10 tacks are needed. The metal is 16 gauge mild steel.

STEP 2. Mounting the tack-welded unit on a turntable, the same operator exchanges the Aircospot gun for an HB-8 Heliweld holder. The Airco Heliweld process joins the circumferential seam at a speed of 16 inches per minute.

Falstrom Company
...eliminates jigs and back-up plates with AIRCOSPOT
...speeds seam-welding 75% with HELIWELDING!

It used to take 17 minutes to tack and weld a complete metal cover at the Falstrom Company, Passaic, N. J. Now, with a combination of Aircospot and Airco Heliwelding, this operation has been reduced to a fraction of the time.

Previous methods of tack-welding required the use of jigs and fixtures—a procedure that hampered the operator and slowed production. Aircospot, however, tack-welds from just one side of the metal. It eliminates jigs and back-up plates, completely streamlining the work flow. At the same time, by using Heliwelding instead of oxyacetylene welding, Falstrom was able to reduce welding time 75%. This faster method of welding thin sections of metal provided further economies as the end product required less finishing and grinding.

One, or both, of these Airco inert-gas shielded arc welding processes can provide similar savings in your particular operation. Contact your local Airco Sales Representative or Authorized Airco Dealer for an on-the-spot demonstration in your plant—or—write Airco direct for complete information. Request Aircospot Catalog #2315, Heliwelding Catalog #2300.

AIRCO

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated, with offices and dealers in most principal cities

Air Reduction Sales Company
Air Reduction Pacific Company

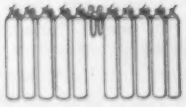
Represented internationally by
Airco Company International

Foreign Subsidiaries:
Air Reduction Canada Limited
Cuban Air Products Corporation

Products of the divisions of Air Reduction Company, Incorporated, include: AIRCO—industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO**—carbon dioxide, liquid-solid ("DRY-ICE") • **OHIO**—medical gases and hospital equipment • **NATIONAL CARBIDE**—pipeline acetylene and calcium carbide • **COLTON**—polyvinyl-acetates,—alcohols, and other synthetic resins.

AN AIR REDUCTION PRODUCT

AIRCO items
for inert-gas-shielded
arc welding



Air Reduction is your preferred source for the shielding gases you need. Argon, helium, or a mixture of gases are employed for Aircomatic, Heliwelding, and Aircospot. Airco supplies them all. Prompt bulk delivery, as well as by the cylinder, are obtainable.

Consult your Airco District Office for specific information concerning gas mixtures and recommendations based on the type of work you are doing.

Airco supplies a complete range of tungsten electrodes for AC and DC Heliwelding. Electrodes are available in pure tungsten, thoriated tungsten, (Thor-Tung) and zirconium tungsten. All three types are offered in seven diameters from .040″ to ½″ and in four lengths from 3″ to 18″. Other lengths of all electrodes on special order.

Aircomatic-Heliweld filler wire is processed to conform to the highest standards for surface finish, cast and cleanliness. Its use assures smooth, uninterrupted wire feed. Specifically designed for use in the Aircomatic manual and automatic head, and the Heliweld filler wire feeder. *Write for literature on these items.*

Flux

A SPECIAL flux for silver alloy brazing of stainless, chromium heat-resisting alloys, chromium and tungsten carbides, "Special Handy Flux Type B-1," is designed to reduce oxides of the refractory metals while protecting the underlying metal from further oxidation during brazing.

The flux, it is said, has ability to withstand heating at 1,400-1,600 F for short times and to increase its life at lower brazing temperatures because it contains a strong deoxidizer and one whose oxide is a flux former. In a sense the flux regenerates itself during the heating cycle and thus provides the longer activity span required for elevated temperatures. After brazing, it can be removed with hot water.

It can be used with AMS 4772 brazing alloy, flow point 1,515 F for brazing jet engine compressor blades, and for the attachment of chromium carbide and tungsten carbide tool tips, states the manufacturer. *Handy & Harman.*

Circle No. 67.

* * *

Electrode

Low-hydrogen electrode for high-speed welding named, "DH-170," is said to have stability and ease of handling.

The manufacturer states it offers 50% faster speed in application, features improved striking and restriking characteristics. Bead appearance and slag removal are also said to be excellent.

It is available in sizes from 3/32 in. up through ¼ in. *Harnischfeger Corp.*

Circle No. 68.

* * *

Sander-grinder

A 9 in. heavy-duty sander-grinder is said to have more power than its predecessor even though it weighs 4 lb less, is available in three different speeds and has a universal motor designed for continuous production duty.

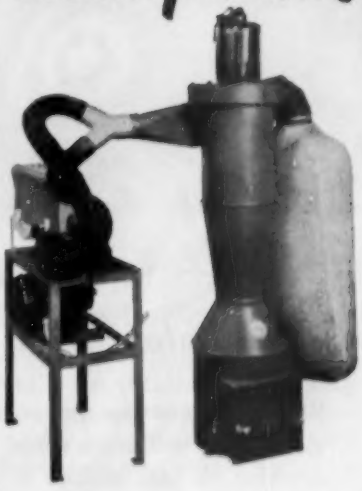
A new type centrifugal fan pulls an increased amount of air through the commutator section to provide a cool-running motor. This fan also keeps the motor almost entirely carbon and dust free. Exhaust air is said to be deflected away from the operator. *Black & Decker Mfg. Co.*

Circle No. 69.

TORIT

DUST COLLECTORS

Really draw!



A size and model to solve any dust collecting problem, Torit collectors provide complete, all-around dust control. Torit collectors are unitized for custom installation on each machine, giving power and suction only when machine is operating. Keeps plant and machines free from clogging and unsightly dust. Furthermore, cleaned and filtered air is exhausted back *into* the room maintaining heat balance. Find out now how Torit unitized dust control is engineered to your problems.

See our catalog in Sweet's Machine Tool File, or write:

TORIT

MANUFACTURING CO.

270 Walnut Street • St. Paul 2, Minn.

ARCOS FOR FINEST QUALITY WELDS

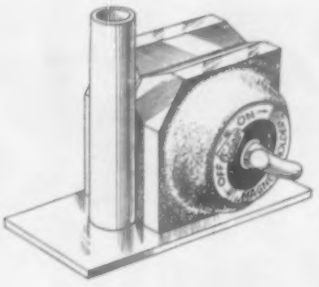
Submerged Arc Welding of Stainless with new Arcosite Flux

Now, for the first time, you can apply the economy of submerged arc welding to stainless steels. No longer need you worry about cracking, or poor transfer of the essential stainless elements. The combination of *new* ARCOSITE FLUX and *new* ARCOS CHROMAR (Stainless Steel) WIRE provides a balanced analysis for sound, dependable welds on every job. It's another example of how Arcos experience with coated electrodes and weld metallurgy is being translated into tangible benefits for you.

Write today for the Arcosite Flux Bulletin and see how you may profit from these two *new* Arcos products. Arcos Corporation, 1500 South 50th Street, Philadelphia 43, Pennsylvania.

WELD WITH ARCOS

STAINLESS WIRE AND ARCOSITE FLUX



Magnetic holder

"ECLIPSE" magnetic holder is a permanent magnet device which is reported to be capable of exerting a powerful hold on iron and steel plates, bars or tubes. The magnetic flux is controlled by turning a handle which is similar to a water tap.

The holder can't be demagnetized unless it is dismantled, which should not be attempted. It requires only occasional oiling and tuning-up of the contracting magnetic faces which should be kept flat and smooth.

Three veed pole faces are designed to hold round bars and tubes, the plain pole faces to secure flat sections such as angle iron, channel or girder sections. *L. H. Chappel & Co.*

Circle No. 70.

* * *

Electrode

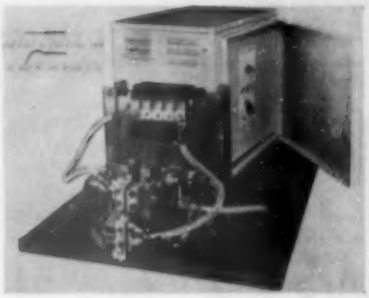
LOW alloy steel arc welding electrodes for the welding of chromium molybdenum alloy steels are of the lime ferritic, AWS 15 type. They are claimed to be excellent for all position welding when using d-c reverse polarity.

"Croloy" electrodes eliminate almost all weld cracking and the need for high preheat temperatures by a controlled weld composition. Unless sections are very heavy, preheat after welding and prior to stress relieving is unnecessary.

The electrodes are available in 3/32 in. through 3/16 in. diameters in four grades: "Croloy 1A" for welding chrome-moly materials in the range of .5% Cr, 5% Mo through 1¼ Cr, .5% Mo; "Croloy 2A" for material of 2% Cr, 5% Mo; "Croloy 2¼A" for material of 2-2.5% Cr, 1% Mo; and "Croloy 5A" for material in the 4 - 6% Cr, .5% Mo range. *Champion Rivet Co.*

Circle No. 71.

For more information use card on page 107



Butt welder

SEMI-automatic oil hydraulic operated butt welding machine for materials from 0.015 in. to ⅛ in. in diameter and tubing 1/16 to ¼ in. in O.D. can be adapted for almost any shape material, according to the manufacturer.

Welding is accomplished by a condenser discharge power supply or by a synchronous timer operating from 1 kva up to 5 kva. The weldor hand feeds the parts to be welded into a fixture against a stop, presses the foot pedal, the parts are clamped, the stop is retracted and the parts are butt welded. The operator then releases the foot pedal and removes the part. *Federal Tool Engineering Co.*

Circle No. 72.

* * *

Corrosion inhibitors

"CI-103" is a film former which dries tack free in three to four minutes and can be removed by simple aromatic petroleum solvent wash, says the manufacturer. It can be used on ferrous and non-ferrous metals.

Effective on either ferrous or non-ferrous metals, "CI-104" is not a coating or film former, but leaves a durable deposit of monomolecular dimension as a moisture barrier on surfaces treated, says the manufacturer. *John B. Moore Corp.*

Circle No. 73.

* * *

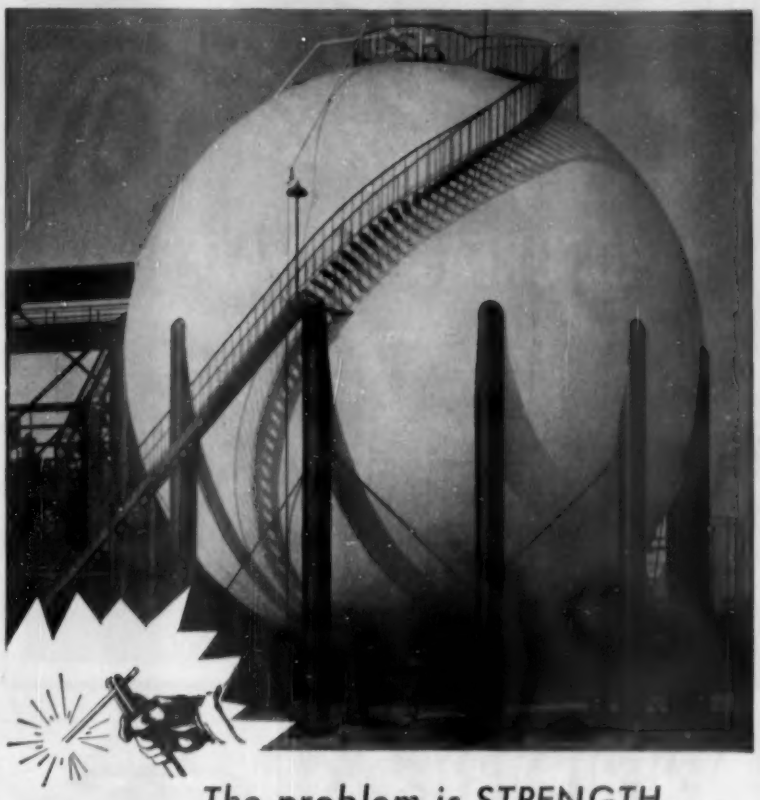
Inspection kit

PORTABLE kit for magnetic particle inspection called "SempuN" is a permanent magnet with ball pivots and multi-self-adjusting magnetic pins, which permit good contact during its use on any size or shape of part.

"SempuN" is supplied with check test piece, remagnetizing leads, and plastic spray bottles containing the inspection medium (iron oxide, powder or ink) all in a convenient carrying case, 8¼ in. by 5 in. by 6 in. *Rice-Peterson Sales, Inc.*

Circle No. 74.

ARCOS FOR FINEST QUALITY WELDS



The problem is STRENGTH... and the WELDS must not fail

A Hortonsphere* is the practical answer to the problems presented by the tensile stress inherent in the storage of gases under high pressure. Its spherical shape assures uniformity of stress—but because all stresses are in tension—the tensile strength of the weld must match that of the high-tensile, low-alloy-steel base metal.

All-welded field fabrication is easy and economical on applications like these with ARCOS Low Hydrogen Electrodes. Welds are uniform whether performed down-hand, vertical or overhead. Economy is assured because *one* electrode that is "just right" for the job can be used for all-position welding. What's more, no preheat is needed to prevent underbead cracking.

When you have a field welding application, or a shop welding problem on high-tensile steels, weld with ARCOS Low Hydrogen Electrodes for assured weld quality . . . time and money savings on the job.

*t.m. reg. Chicago Bridge & Iron Co.

WELD WITH ARCOS LOW HYDROGEN ELECTRODES

YOUR "CAT" HAS NINE LIVES

WHEN PROTECTED WITH

Ranite

HARDSURFACING MATERIALS

Special instructions are available (form A6-1) explaining welding procedure for rebuilding tractor and shovel rails, rollers, sprockets, and idlers. Included are tractor parts specifications so you will know the exact finish weld dimensions. Contact your RANITE distributor or write to factory for your copy of this useful bulletin.

RANKIN MANUFACTURING CO.

3072 WEST PICO BLVD. · LOS ANGELES 6, CALIFORNIA

FEDREX

120s

for X-Ray Spot Checks

- Short Exposures
- Easy Handling
- Economical
- Lightweight
- Weatherproof

FOR USE IN FIELD

A new low-cost, lightweight, portable, 120 kvp. 5 ma X-ray unit especially designed for spot checking welds in accordance with API Specifications for Welded Tanks, API Standard 12c—12th Edition.

The small dimensions (14 in.) and light weight (75 lb) of FEDREX 120s make it easy to handle, even in cases of field welds not readily accessible. Also available in 160, 200 and 260 kvp sizes.

Write today for complete details and prices

Distributed Nationally by

Machinery & Welder Corporation

1324 West Fulton Street

Chicago 7, Illinois

NEW PRODUCT BRIEFS

Two-stage 100-lb rotary air compressor/vacuum pumps for shop air systems, drill rigs, pneumatic conveyors, gas compression and similar applications are water cooled. *Allis-Chalmers Mfg. Co.*
Circle No. 75.

• • •

Continuous-action, automatically reciprocating air-hydraulic booster delivers high pressure fluid for the operation of hydraulic cylinders. *Miller Fluid Power Co.*
Circle No. 76.

• • •

"Thick-Coat" is a resin coating product which is said to offer better protection for surfaces exposed to humid and corrosive atmospheres. *Pennsylvania Salt Mfg. Co.*
Circle No. 77.

• • •

Safety floor armor that has less weight per square foot and a greater exposed steel surface is designed for abnormal wear, and it is economical to install, according to the manufacturer. *Klemp Metal Grating Corp.*
Circle No. 78.

• • •

"Lexsuco," a roof construction which retards fire, is said to eliminate all combustible bitument from the vulnerable area between the roof deck and the insulation. *Lexsuco, Inc.*
Circle No. 79.

• • •

Solid aluminum alloy disc hand wheels for use on jigs and fixtures for cranking shafts are made of aluminum alloy and feature a finished O.D. with boss faced off and spot centered. *Jergens Tool Specialty Co.*
Circle No. 80.

• • •

Lightweight protective hood is made of "Fyre-Armor," the aluminized flame and heat resistant fabric, and is said to be the latest firefighter's weapon against radiant heat temperatures as high as 2,500 F. *Far-Ex Corp.*
Circle No. 81.

• • •

Total protection is said to be built into new a-c motors from solid-cast frames to the plastic sleeving that protects brazed coil head connections in the insulated "heart" of the motor. *Reliance Electric & Engineering Co.*
Circle No. 82.

NEW Arc Welding System using Murex® CROLOY Electrodes

for Welding CHROME-MOLY STEEL used in HIGH TEMPERATURE—HIGH PRESSURE SERVICE

See M & T's full line of electrodes at the AWS Welding Show Kansas City, June 8-10, Booth 250

- **PRODUCES JOINTS AS DEPENDABLE AS THE METAL YOU WELD**
- **SIMPLIFIES THE WELDING OPERATION**
- **SAVES YOU TIME AND MONEY**

IT'S NEW

IT'S PROVEN

IT'S ECONOMICAL

IT'S DEPENDABLE

M & T now brings you a new arc welding system using Murex CROLOY electrodes for fabricating and repairing chrome-moly steel equipment used in high temperature—high pressure service.

For years one of the nation's foremost producers of power piping and high pressure boilers has been using CROLOY electrodes in production. Their experience has proven the excellent operating characteristics of the electrodes, the dependability of the welds under high temperatures and pressures, the economy of the welding system.

With the new system you can greatly simplify preheat and postheat operations . . . you can practically eliminate underbead cracking, forget about costly defective welds . . . you can dispense with stress relieving on many weldments . . . you can weld chrome-moly steels more economically.

Murex CROLOY is a chrome-moly weld metal of outstanding stress rupture characteristics and high ductilities over a wide range of temperatures. Further information is available on this new welding system and the unique electrodes that have made it possible. Just write, or have a Murex man call.

METAL & THERMIT CORPORATION

Welding Division

100 EAST 42nd Street • NEW YORK 17, NEW YORK

from page 6

be represented with exhibits.

Canadian firms will take up about half of the space. Other participating countries include Argentina, Austria, Belgium, Czechoslovakia, England, France, Germany, India, Italy, Japan and the United States.

Exhibits will cover a great variety of goods and materials. Some of the booths will show, for example, new developments in electronics, uses of atomic power for industrial purposes, the latest in machine tools and plant equipment, new aircraft, new developments in office equipment and business machines, consumer goods such as textiles, jewelry, household appliances, etc.

There will also be great variety in the welding and metals section of the Fair. Included will be metal and metal alloys of many types, solders and fluxes, petroleum products, chemical products, torches, many varieties of welding machines and controls, fittings, flanges and related equipment, etc.

Among the new products will be a battery and welding unit for d-c rectifiers. Also, a fast method of applying threaded or unthreaded studs and other fasteners by means of a complete cross-sectional arc weld at the stud base will be demonstrated.

Originally the welding and metals section was allotted 10,000 sq ft of space for exhibits. However, pre-registration has already passed that figure and the present estimate is 15,000 sq ft. Canada, England, France and the United States have already entered exhibits.

During the Fair, the Canadian Welding Society, sole Canadian member of the International Institute of Welding, will hold its first national convention. It will present a series of lectures on new welding alloys, methods, equipment and standards. The CWS will also exhibit samples of modern practice illustrating these factors through the courtesy of research, inspection and industrial agencies.

This will be the eighth consecutive year that the Trade Fair has been held. Approximately 50 countries have been represented each year.

* * *

Alloy Rings

cut Brazing Rejects to less than 1% in Refrigerator Compressor Dome Assembly

* Actual photo of refrigerator plant production line where 11 joints are brazed on one assembly with less than 1% rejected under Underwriter's pressure test of 1500 lbs. per sq. in.

Alloy brazing materials insure a perfect job every time . . . consistently uniform, trouble-free brazing with no rejects . . . no reworking!

No question about it—Production Brazing with Alloy Rings is the practical answer to many expensive metal joining problems. Investigate . . . production brazing can help you conquer those sky-high production costs.

Precision is of the utmost importance in successful brazing. For infallible results insist on precision-made Alloy Rings. Special Alloy packaging methods speed production and cut waste to a minimum.

Write for full information on brazing rings, preformed shapes, silver alloy, copper, soft solder and flux.

Alloy RINGS

ALLOY RING SERVICE, INC. • 1075 EAST 52ND STREET • INDIANAPOLIS 5, INDIANA

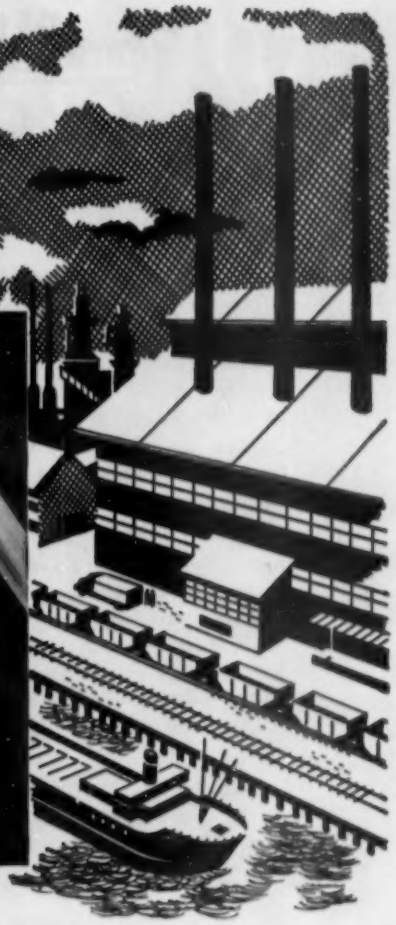
Refrigeration units fabricated with Tig and Mig welding

A manufacturer of transport refrigeration equipment is using Tig (tungsten inert-gas) and Mig (metal inert-gas) to produce high-quality welds in all-aluminum "Thermo King" units for trucks and trailers.

The U.S. Thermo Control Co., Minneapolis, has six Tig welding stations and two Mig stations. The combination of methods has cut welding time 67% on one model of a cooling unit and 85% on a smaller model.

—Linde Air Products Co.

TERRIFIC HEAT !

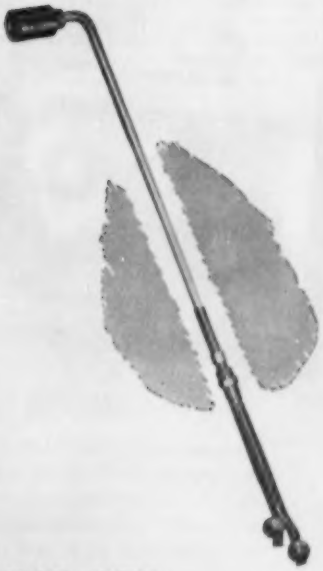


HARRIS SUPER-HEAT TORCH NO. K23

Heat is the Prime Factor utilized in connection with innumerable Metal Working Operations. While it is a fact that the Oxy-Acetylene Welding Torch is universal in its applications, there are many Operations requiring a much greater volume of Intense Heat than can be obtained from a Welding Torch.

A definite limitation exists relative to the amount of Oxygen and Acetylene Gases which can be safely mixed without danger of the Flame "Back-firing", due to the extremely fast Flame Propagation Characteristics of such Gas Mixtures. On the other hand, much larger volumes of such Fuel Gases as Propane, City Gas and Natural Gases can be safely mixed with Oxygen on account of their lower rate of Flame Propagation. It is evident the larger the volume of Gases mixed, the greater the Flame and resulting Heating Value. This produces the truly phenomenal results achieved by this Harris Super-Heating Torch.

The applications of this Harris Torch are unlimited, where large volumes of Intense Heat are required, either as a Portable or Stationary Unit. In places where Massive Shafts are to be Straightened; Large Size Pipe Bent; Flanging or Straightening of Steel Plates; Brazing Heavy Copper Pipe, etc., etc., this Harris Torch, with its **TERRIFIC HEAT**, is the answer.



HARRIS 1903 50 1953 ANNIVERSARY

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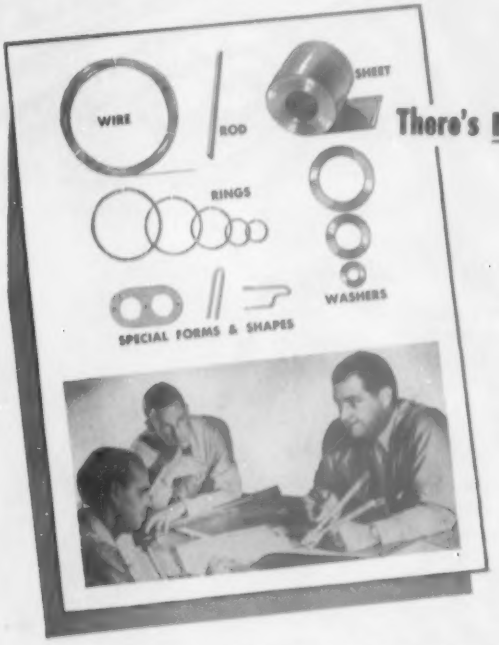
THE HARRIS CALORIFIC COMPANY
CLEVELAND 2, OHIO

WHY are EASY-FLO and SIL-FOS the largest selling silver brazing alloys in the United States?

THERE ARE TWO COMPELLING REASONS WHY:

1. Because these low-temperature silver brazing alloys—developed and patented by Handy & Harman over 20 years ago—are outstanding in their remarkably fast brazing action and ability to make high-strength, liquid and gas tight joints in ferrous, non-ferrous and dissimilar metals. These results are inherent in their time-tested compositions and physical properties.
2. Because thousands of brazing alloy users recognize this important *PLUS value* that goes with the alloys—Handy & Harman's unmatched technical knowledge about silver alloy brazing and practical field experience in its application, backed by research and development facilities unequaled in the industry. These SERVICES are always available to every user, without obligation. They assure maximum benefit from the use of EASY-FLO and SIL-FOS.



There's no "or equal" for EASY-FLO and SIL-FOS and for the SERVICE that goes with them

SEND FOR THIS "DISTRIBUTOR LIST"

You can get the real EASY-FLO and SIL-FOS alloys and their companion low-temperature HANDY FLUX, only from Handy & Harman Authorized Distributors, located in principal centers throughout the country. Write for the "Distributor List" and contact the one nearest you.

HANDY & HARMAN

General Offices: 82 Fulton St., New York 38, N. Y.

DISTRIBUTORS IN PRINCIPAL CITIES

OFFICES and PLANTS
BRIDGEPORT, CONN.
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MONTREAL, CANADA

Norelco announces new dealer territories

The Research & Control Instruments Div., North American Philips Co., Inc., Mount Vernon, N. Y., recently announced the following new dealer territories:

Atlantic Precision Instrument Co., Boston, now serves Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont.

Henry N. Beets Co., Los Angeles; for Arizona, southern California and Clark County in Nevada.

Braun-Knecht-Heimann Co., San Francisco and Salt Lake City; for Hawaii, Utah and parts of California and Nevada.

Harshaw Scientific, Cleveland, Cincinnati, Detroit and Buffalo; for Ohio, Kentucky, Michigan, Tennessee, and parts of New York, Pennsylvania and Indiana.

John J. Maguire Co., Washington; for District of Columbia, Maryland, Delaware, Virginia, North and South Carolina and part of West Virginia.

F. J. Mullowney X-ray Co., Trenton, N. J.; for New Jersey and part of Pennsylvania.

H. E. Pengelly X-ray Co., Milwaukee; for Wisconsin.

Pitchford Scientific Instruments Co., Pittsburgh; for parts of Pennsylvania and West Virginia.

Scientific Supplies Co., Seattle, Portland, Spokane and Vancouver; for Washington, Idaho, Montana, Oregon and Alaska.

Technical Equipment Corp., Denver; for Colorado, Wyoming, New Mexico and part of Nebraska.

Industrial Controls Inc., Tulsa; for Oklahoma, Arkansas and part of Kansas.

North American Philips Office, Chicago; for Illinois, Iowa, Minnesota, Missouri and parts of Indiana, Nebraska and Kansas.

North American Philips Office, Houston; for Texas and Louisiana.

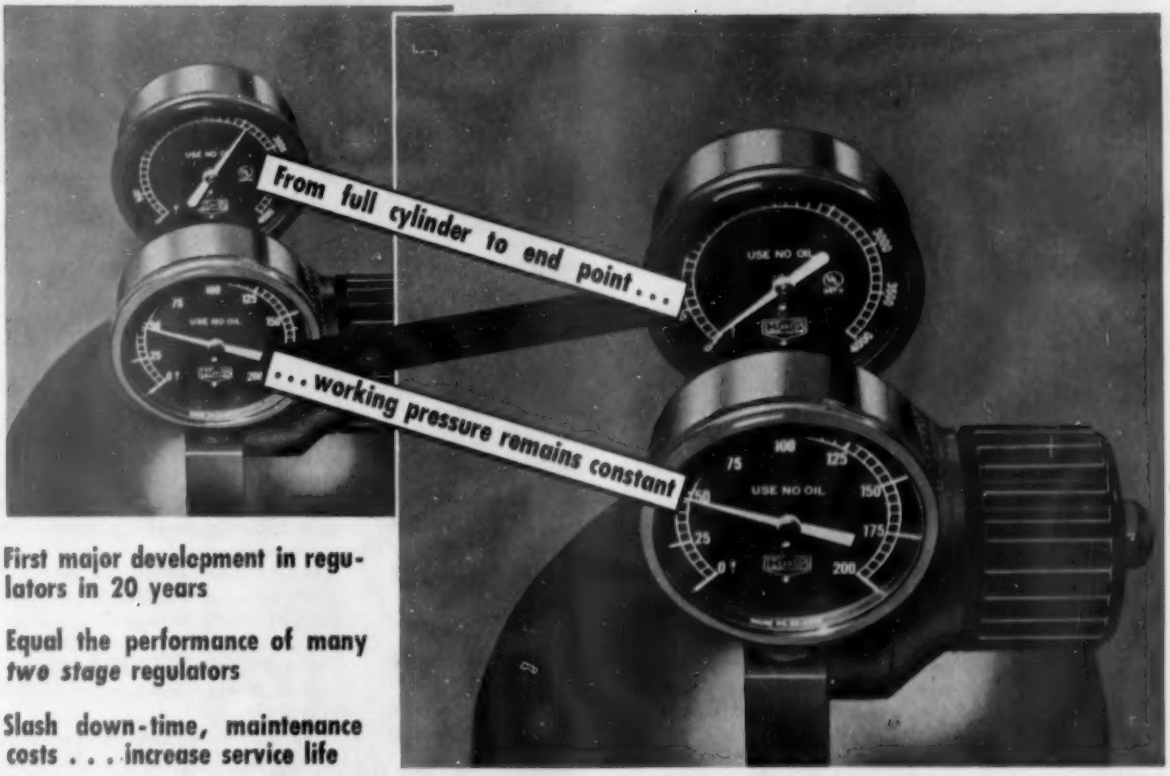
North American Philips Office, Atlanta; is scheduled to open soon to serve Mississippi, Alabama, Georgia and Florida.

* * *

Cemented carbide producers form new association

Manufacturers of cemented carbides containing tungsten recently formed the Cemented Carbide Producers Association for the purpose of furthering use of their products. Membership is comprised of most of the producers in the United States. Hunter - Thomas, Associates, Cleveland, is in charge of the association's affairs.

New K-G Single Stage Regulators Out-perform All Others



First major development in regulators in 20 years

Equal the performance of many *two stage* regulators

Slash down-time, maintenance costs . . . increase service life

Get jobs done better, faster . . . virtually eliminate pressure readjustment. The new K-G Single Stage Regulators equal the performance of many two stage regulators—yet cost no more than many standard single stage models.

This superior performance—plus longer life and faster, easier maintenance—are the result of an entirely new, simplified design:

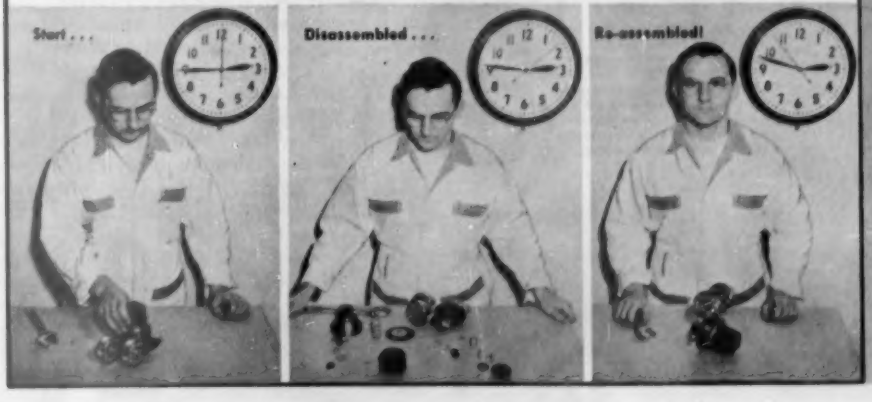
Bodies and bonnets are anodized aluminum alloy forgings . . . are stronger, lighter, more resistant to corrosion. The large-size diaphragm greatly increases sensitivity . . . a new stainless steel sintered metal filter practically eliminates seat failure . . . the adjusting mechanism rides on ball bearings for smooth, accurate control—is *fully enclosed* for complete protection against damage or loss.

The new single stage models—1200 Series—are available for practically all compressed gases, as are the new companion-product two stage models—1100 Series (for the ultimate in performance!). *The K-G Equipment Co., Inc., Dept. A., 1744 Lehigh St., Allentown, Pa.*

Ask Your K-G Distributor for a Demonstration—Send for New 24-page K-G Catalog

(Distributors: Valuable territories still open. Write for information!)

Take Apart, Re-assemble in 3 Minutes!

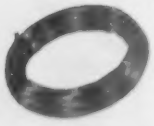


AMAZING FILTER ACTION
is shown by this sand test. Ask your K-G Distributor to demonstrate!

NO MATTER WHERE YOU ARE

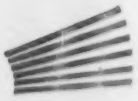
A GB DISTRIBUTOR

is ready to give you practical, "down-to-earth" help on your silver brazing jobs.



GB's Distributor Sales Organization is made up of experienced salesmen who have a broad background of practical operating experience, as well as technical training, in silver brazing applications. One of those men is in your area—and he wants to work with you to find how GB Silver Brazing Alloys and GB Fluxes will speed up your operations, give you maximum results and save you money.

Each GB standard Silver Brazing Alloy is developed for specific cost and production requirements. They are all available in these easy-to-use forms . . . wire in coils or straight lengths, strips, sheets, simple or intricate formed pieces.



Call in your GB distributor for all the facts about the GB line—he'll gladly supply you with working samples of GB alloys and fluxes, as well as give you helpful assistance on any brazing problems you may have. (If you don't know his location, simply write us and we'll send his address.)

GB FLUXES . . . available in three main types to cover the low temperature silver brazing range:
GB No. 99—working range up to 1350° F
GB No. 88—working range up to 1650° F
GB No. 27—working range up to 2000° F

GB FLUXES . . .
Dissolve metallic oxides readily
Provide uniform flow of silver brazing alloy
Insure high joint strength

GB FLUXES

The physical properties and appearance of a brazed joint are controlled to a large degree by the flux which is used. For this reason it will pay you to team-up GB Flux with GB Silver Solder—they were developed to produce maximum results when used together.

GOLDSMITH BROS.
SMELTING & REFINING CO.
1300 W. 59th, CHICAGO, ILL.
Suppliers of Precious Metals to Industry Since 1867

ARF designs device to simulate bomb blasts

A laboratory device for simulating the blasts from bombs has been designed at Armour Research Foundation, Chicago. The instrument, called a "shock tube," gives engineers a chance to study the effects of blasts without exploding a bomb.

The tube has a 6 ft diameter and an over-all length of 150 ft. It is important because it enables scientists to study the effects of blasts on larger-scale models of buildings which might be exposed.

In order to absorb the maximum recoil force of 600,000 lb, the foundation of the tube was designed as a slab of reinforced concrete 10 ft wide, 3 to 4 ft thick, and 100 ft long with keys 10 ft wide and 6 ft deep spaced 20 ft apart.

The tube works as a certain amount of combustible gas is introduced into one section of the tube and is confined by a light diaphragm. The diaphragm is shattered when the gas is ignited, and the released pressure wave travels down the tube to the test section, where a building model has been placed. The resulting forces are recorded with electronic equipment.

* * *

AWS chapter to award best welding student

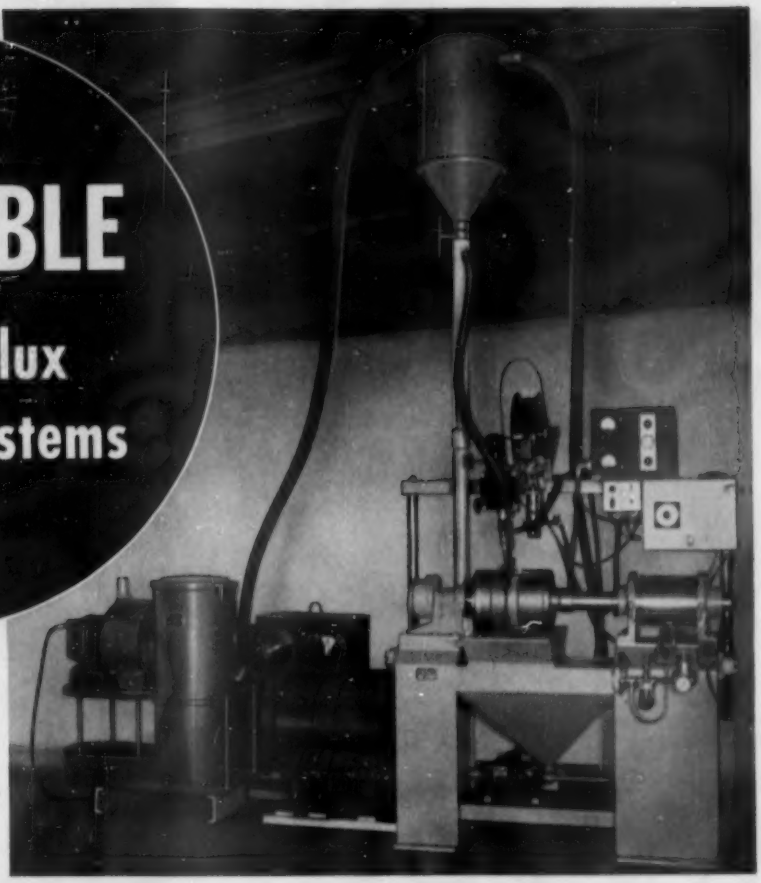
The Tucson chapter of the American Welding Society recently announced that the most proficient welding student enrolled in a vocational high school welding course in southern Arizona will receive more than $300 worth of welding equipment.

A series of projects has been set up for the student weldors and final judging will be made by a committee from the local section assisted by John Austad, Austad Steel; J. W. Tarpley, Tucson Iron Works; and William Voorhees, Tucson Steel Fabricators.

The award will include a complete welding and cutting outfit, a set of oxygen and acetylene cylinders and a hardfacing kit.

INVINCIBLE

Welding Flux Recovery Systems



This compact set-up includes a primary separator tank and standard Model 460 unit. Compressor parts for a large refrigerator manufacturer are being welded.

Pay for themselves . . . with interest!

Thousands of Invincibles are at work throughout industry . . . salvaging valuable welding flux, saving labor, making the welding operation more efficient. Invincibles repay their cost in a short time, then pay an additional service bonus.

If you have a submerged arc welding job, consider these features of Invincible Flux Recovery Units:

1. Invincibles save valuable flux by recovering *all* loose flux from the work, removing slag or fused particles, and returning the unfused flux to the hopper of the welder. Both manual units and completely automatic (continuous flow), systems are available.

2. Invincibles save costly man-hours—release men for other important work. Invincibles do the job automatically, more rapidly and efficiently than manual methods.

3. Invincibles save you money caused by rejects; by removing all fine dust (flux flour), they speed production and reduce welding rejects.

These Invincible advantages can be applied to your job, regardless of its size or type. Let us send you this *Free Folder* on Flux Recovery. Illustrated case histories show how Invincibles save time and money on installations of all kinds.

INVINCIBLE VACUUM CLEANER MFG. CO.

DOVER, OHIO

OVER 50 YEARS THE LEADER IN INDUSTRIAL VACUUM EQUIPMENT

UNITED'S PHOSON BRAZED JOINTS

for **Pressure Piping**

Mean Continual

Trouble-free Operation at

Manhattan House

New York Life Insurance Co.'s Modern 20-Story Apartment in New York City

Here is proof positive of PHOSON'S dependable, low-cost efficiency!

Engineering specifications for Manhattan House specified all joints be brazed between copper tubing and threadless wrought copper fittings and cast bronze valves for the forced hot water heating system to be operated at 115 PSI at a temperature of 240°.

Brazed joints were specified to assure strong non-corrosive permanently safe construction . . . and PHOSON was specified because it had the highly dependable physical properties so necessary and the joints could be brazed rapidly and at low cost!

PROVE PHOSON IS BEST FOR YOUR JOB — LARGE OR SMALL!

Contact your UNITED Welding Supply Distributor

Typical Manhattan House Brazed Joint

UNITED WIRE AND SUPPLY CORP.

Brazing Alloy Division

PROVIDENCE 7, R. I. • OFFICES IN PRINCIPAL CITIES

Ask to see the new United Wire color film "When Metals are Brazed". Write for showing dates and literature.

Permanently United

SEND FOR SPECIAL PHOSON FOLDER NOW!

Bedplate for testing machine welded by Baldwin

The 70-ton bedplate for a 5,000,000 lb testing machine was recently planed in the Baldwin-Lima-Hamilton machine shop at Eddystone, Pa. The testing machine, which will be installed at Lehigh University later this year, will have a maximum clear space for test specimens 40 ft high and 10 ft between columns.

Unlike bedplates for former machines of the same capacity, but of less height, a weldment was specified. It measures 23 ft 10 in. long, 11 ft 3 in. wide and 4 ft thick. The structure was fabricated, X-rayed, and stress-relieved in the company's weld shop.

* * *

B&W operates new quality control lab

A new quality control laboratory recently began operation at The Babcock & Wilcox Co.'s Tubular Products Div. plant in Beaver Falls, Pa.

The two-story laboratory spreads over 29,000 sq ft of floor space. More than four years of planning and building went into this structure, which houses equipment for all kinds of inspection and testing procedures.

* * *

Classrooms turn to steel for solution of problem

Due to the classroom shortage throughout the United States, there is an increased interest in one-story school buildings of all-steel construction, according to American Iron and Steel Institute. These structures are preferred because they can be constructed quickly and economically, they are non-combustible, and reduce the hazard of small fires becoming big ones. School equipment of almost every kind is now being made of steel.

* * *

New metals testing chamber operates 452 below zero

Metallurgists at Westinghouse Research Laboratories are conducting tensile tests on metals at temperatures as low as minus 452 F. The metal specimens are stressed within a specially designed chamber which has been cooled with liquid helium. Test results will provide needed information regarding types of metal that are best suited for use under extreme temperature ranges. This information may be useful in the design and development of guided missiles and future supersonic aircraft.

Photo courtesy New England Hard Facing Co.

build up smoother, more uniform surfaces with CRUCIBLE metalizing CORE WIRE . . .

For consistent uniform spray . . . quick build-up and smooth, sound deposit, you can depend on Crucible *stainless steel* metalizing core wire. For, like all of Crucible steels, it's *prescription-made* for the job. And it's backed by over a half century of *special purpose* steelmaking experience.

Crucible metalizing wire is made in a wide variety of stainless steel grades for corrosion-, abrasion- and heat-resisting applications. There's a grade for every need. Next time you require metalizing wire, call your nearby Crucible warehouse. And for your free copy of our new booklet on stainless steel wire, write *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 22, Pa.*

Visit us in Booth 246
American Welding Society Show
Kansas City — June 8-10

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Make More Money on EVERY Welding Job..

METAL BOND
SOLDERING AND WELDING
PRODUCTS

We have been making Metal Bond Products for more than 25 years and successful Welders all over the country have been using them to advantage.

AIDS TO GOOD WELDING JOBS

- Tinning Compounds
- Soldering Salts
- Hard Metal
- Aluminum Solder
- Moul-dough
- Brazing Flux No. 10
- Special No. 31
- Seal-X-O
- Cast Iron Welding Flux No. 4
- All Steel Wire Brushes and Holders.
- Make your own test—also send for our pocket-size catalog which contains information and descriptions of our money-saving METAL BOND Products.

METAL BOND MFG. CO.
MONTGOMERY CITY, MO.
P.O. BOX 215

Alcoa starts production of welded tube mills

Production was recently started on two new aluminum welded tube mills at the Aluminum Co. of America works in Alcoa, Tenn. With these mills the company will be able to produce welded aluminum tube and pipe from ½ in. to 8 in. in diameter.

The first products available are welded furniture tube and three sizes of welded irrigation pipe.

The operation of the mills is continuous and begins as a coil of aluminum strip is fed into levelling rolls which flatten it before it is formed and welded. The strip is roll-formed into a tubular shape after edge trimming and passes through a short inductor coil where the unjoined edges of the pipe are fused together by induction welding.

* * *

American Brass Co. plans new brass mill in LA

The American Brass Co. will soon start construction of a new brass mill in the Paramount district of Los Angeles. The new mill will produce copper and copper-base alloys in the form of sheet, strip, rod, tubing and drawn copper products. It will be a one-story structure of heavy steel and will be equipped with overhead crane service throughout.

The company is also planning construction of an aluminum fabricating plant at Terre Haute, Ind., and a production facility for flexible metal hose and tubing at Mattoon, Ill.

* * *

Armour Research Foundation gets nuclear reactor

A nuclear reactor designed for private industrial research will be built for the Armour Research Foundation on Chicago's south side by North American Aviation, Inc., Downey, Calif. If everything goes well, the foundation should have a going reactor by the end of the year.

The reactor will be located in a new building inside a room about 48 ft long, 72 ft wide and 30 ft high.

Midwestern industries have joined the foundation in financing the reactor and associated equipment, which will cost approximately $500,000.

* * *

Two companies join ranks of RWMA

Progressive Welder Co., Detroit, and United Welders, Inc., Bay City, Mich., have recently joined the Resistance Welder Manufacturers' Association.

Tempilstik° FOR ALL
HEAT-DEPENDENT OPERATIONS

looks like a crayon...
marks like a crayon...
tells temperatures like a precision instrument!

Sixty-three different compositions enable you to determine and control working temperatures from 113° to 2000° F. TEMPILSTIK° marks on workpiece "say when" by melting at stated temperatures—plus or minus 1%.

ALSO AVAILABLE IN LIQUID AND PELLET FORM...WRITE "WELDING SALES" DEPT. FOR SAMPLE TEMPIL° PELLETS...STATE TEMPERATURES OF INTEREST—PLEASE!

Tempil°
CORPORATION
132 WEST 22ND STREET, NEW YORK 11, N. Y.

Available in these Temperatures (F.)

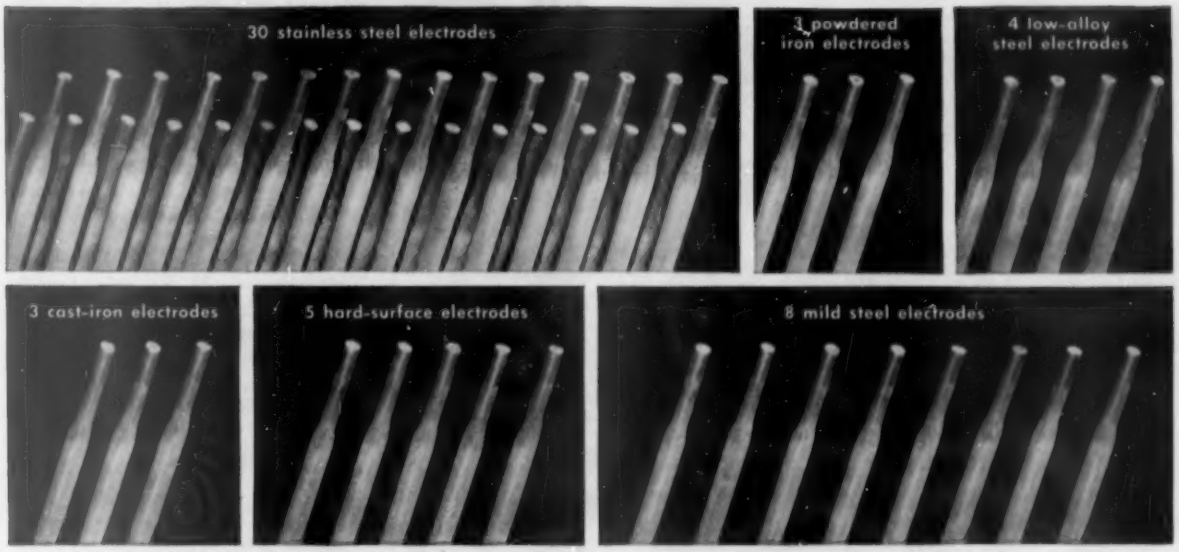
113	375	1000
125	388	1050
138	400	1100
150	413	1150
163	425	1200
175	438	1250
188	450	1300
200	463	1350
213	475	1400
225	488	1450
238	500	1500
250	550	1550
263	600	1600
275	650	1650
288	700	1700
300	750	1750
313	800	1800
325	850	1850
338	900	1900
350	950	1950
363		2000

VISIT US AT BOOTH 216
WELDING & ALLIED INDUSTRIES EXHIBIT
KANSAS CITY, JUNE 8-10

Take two minutes to read this:

Try Westinghouse Electrodes of your choice at our expense. No obligation

The Westinghouse line consists of:



Pick any electrode from the full Westinghouse line illustrated above. Call your local Westinghouse welding distributor. Ask for free sample packs of electrode best suited to your welding job. If you're not sure which you need, he'll be glad to suggest proper types. He'll send them out the same day. You're under no obligation. Samples are sent absolutely free!

WHY WE MAKE THIS OFFER—Words can't sell electrodes. On-the-job performance can. On your job. Under your conditions. We want you to prove to yourself—on these terms—Westinghouse electrode superiority.

YOU CAN'T LOSE—You've everything to gain. Call your Westinghouse welding distributor today. Or send coupon below. Don't put it off. Act now.

J-21868

SEE DEMONSTRATIONS

of Westinghouse electrodes, machines and WEST-ING-ARC MIG welding process

AT WELDING SHOW **BOOTH 270**

Municipal Auditorium, Kansas City, Mo.

June 8 • 9 • 10

YOU CAN BE SURE...IF IT'S Westinghouse

Westinghouse Electric Corporation
Welding Division, Buffalo, N. Y.

☐ Put me in touch with Westinghouse welding engineer
☐ Send full-line Westinghouse electrode folder

Name_____ Title_____

Company_____

Street & No._____

City_____ Zone_____ State_____

WE-5-55

Butter churn is Mig welded

Mig (metal inert-gas) welding is being used in the fabrication of commercial aluminum butter churns by General Dairy Equipment Co., Minneapolis, to produce smooth, porosity-free welds. These areas are easy to clean, thus avoiding contamination.

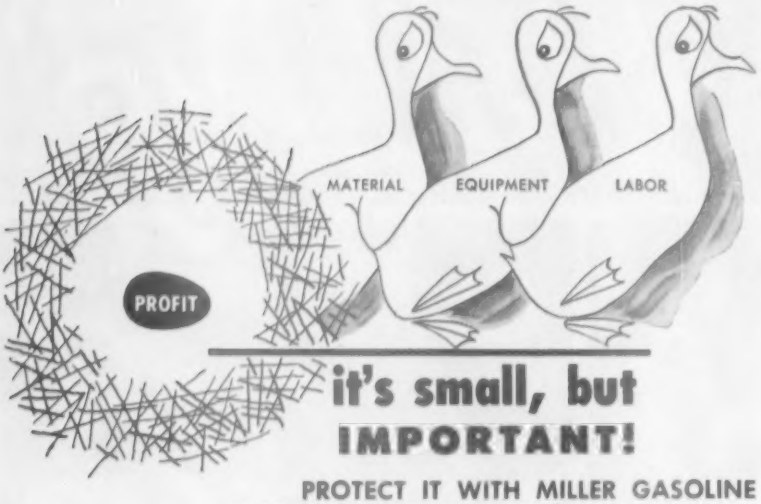
The aluminum is also easily and efficiently welded by this inert gas shielded welding process. Welding speed is greatly increased and the weld beads are dense and sound. Many times the weld is smooth enough for the finishing operations to be eliminated.

—Courtesy Linde Air Products Co.

* * *

Welding experts to meet in June at Frankfurt

The annual meeting of welding experts of the German Welding Society will takes place in Frankfurt/Main from June 13 to 16.



it's small, but IMPORTANT!

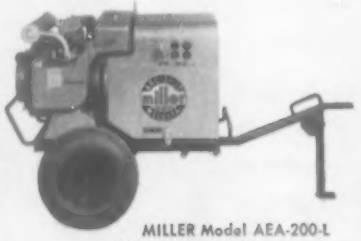
PROTECT IT WITH MILLER GASOLINE ENGINE DRIVEN WELDER/POWER PLANTS

Don't let breakdowns eat up the profits on your construction job. MILLER gasoline engine driven units will weld your equipment — put it back to work — in a hurry — *anywhere.*

Six models to choose from. Your selection of a-c or d-c welding current up to 350 amperes. 110/220 volt a-c power plants for lighting, etc., available on most models.

All MILLER gasoline engine driven units are powered by the popular Onan air cooled engine. Welder/power plants can be furnished skid mounted or equipped with a road towing trailer.

Write for complete information today.



MILLER Model AEA-200-L 200 ampere combination a-c welder/power plant mounted on road towing trailer.

MILLER Model DEA-300-L 300 ampere combination d-c welder/power plant mounted on road towing trailer.

miller ELECTRIC MANUFACTURING COMPANY, INC.
APPLETON, WISCONSIN

Distributed in Canada by Canadian Liquid Air Company, Ltd. Montreal, P. Q.

Compressed Gas Association announces appointments

At the recent meetings of the executive board of the Compressed Gas Association, Barada & Page, Inc., Kansas City, Mo., was elected an active member of Class F. Safety First Products Corp., Dominion Tar and Chemical Co. Ltd. and Charles L. Gulick & Co. resigned from the association.

The following committee heads for 1955 were announced: L. Dimitri, Acetylene; H. T. Hancock, Atmospheric Gases and Hydrogen; B. W. Goulding, Carbon Dioxide; R. N. Dawson, Cargo and Portable Tanks; Harold Hoffman, Cylinder Manufacturers'; E. T. Keehan, Cylinder Specification; R. H. Sullivan, Cylinder Testing; M. L. Griffin, Development; J. J. Lincoln, Jr., Executive; R. C. Holbrook, Finance; H. E. Heigis, General Technical; H. Emerson Thomas, Liquefied Petroleum Gases; W. Strobach, Low Pressure Small Specialty Containers; O. M. Randel, Membership and Publicity; W. D. Gilder, Metallurgical; James W. Dunham, Program and Papers; Don Sener, Regulations; A. R. Hutt, Safety Device; F. C. Saacke, Standards; R. E. Poethig, Valve Standards; and R. H. Stewart, Welding.

* * *

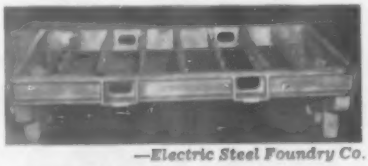
"Ring test" detects cracked grinding wheels

A MUSICAL tone will tell whether a grinding wheel will go around. That is why a "ring test" is recommended to detect wheels cracked in transit, storage or handling.

Engineers of Electro Refractories & Abrasives Corp., Buffalo, say a wheel with a vitreous or porcelain bond will ring like a bell when struck on the side with a wooden hammer. Best spot to tap a wheel for the test is about 45 deg either side of vertical center line and about 1 or 2 in. from the periphery. A cracked wheel gives off a dull, not a tinkling, sound.

* * *

Switch to welding



—Electric Steel Foundry Co.

SCREEN frames for a vibratory pulp screen, which were fabricated with bolts, requiring expensive machine work and fastenings, are now of welded construction. Greater durability and economy have been achieved.

Ultrasonics finds still another application

Met-L-Chek Co., Los Angeles, has applied ultrasonic vibration to its visible penetrant inspection method with what is said to be startling improvement in speed and effectiveness. The ultrasonic equipment is compact and simple to operate. It can also be used for general surface cleaning when the ultimate in soil removal is desired for plating, painting and other processing.

High-speed vibration greatly accelerates penetration, water washing to remove excess penetrant dye, and development of flaw indications.

* * *

St. Louis is site of new sales district for Kaiser

Kaiser Aluminum & Chemical Sales, Inc., has announced the establishment of a new sales district in St. Louis. It will serve aluminum fabricators in eastern Missouri, southern Iowa, eastern Arkansas, western Tennessee and northern Mississippi.

Donald C. Heyel, formerly Baltimore branch manager, has been appointed district manager.

* * *

Jones & Laughlin purchases Hamilton warehouse business

The Hamilton Steel Co., Cleveland, recently sold its steel and aluminum warehouse business to Jones & Laughlin Steel Corp., Pittsburgh. The Hamilton name will still be used.

Hamilton was a subsidiary of Federated Steel Corp., Pittsburgh, which will continue in the steel and aluminum warehouse business through its Pittsburgh division, Fort Duquesne Steel Co. and its subsidiaries.

This acquisition gives Jones & Laughlin its first warehouse outlet in Cleveland.

* * *

Metallurgical engineering department formed at NYU

A department of metallurgical engineering was recently established at the New York University College of Engineering. Metallurgy used to be taught in the chemical engineering department. Facilities of the new department include a completely equipped metallurgical research laboratory and a smaller undergraduate lab.

* * *

Norton's L.A. office moves to new location

The Los Angeles district office of Norton Co. has moved to 5905 Pacific Boulevard, Huntington, Park, Calif.

Visit our Booth 227, WELDING SHOW, Municipal Auditorium, Kansas City, June 8-10, 1955

FOR QUALITY WELDMENTS use Drawalloy CORPORATION

QUALITY CONTROLLED STAINLESS STEEL WELDING WIRE

- available in Spools, Coils and Lengths
- for Automatic and Semi-Automatic gas and inert arc welding

Welding wire by Drawalloy is made to an exacting high standard . . . a high standard established by long-experienced welding men who know welding wire and how it must work. Set-ups for automatic and semi-automatic welding take more time than regular welding. That's why you want to be sure of satisfaction *before* you start. This *reliable* wire is weld-tested to give the best results every time. Write today for complete information and prices.

Drawalloy CORPORATION

LINCOLN HIGHWAY AT ALLOY STREET • YORK 12, PENNSYLVANIA

ANNOUNCING . . . The most revolutionary achievement in ARC WELDING equipment in years!

Dimensions: only 11" x 12" x 7½"

BREN-WELD MODEL 200 AW

Weighs only 65 lbs.— Carry it to the job!

Patent Pending

FIRST TRULY PORTABLE 200 AMP. OUTPUT ARC WELDER

OBSOLETES ALL OTHER WELDERS OF COMPARABLE RATING

List Price $169.50 F. O. B. Long Island City, N. Y.

Sensational new transformer development produces far more power to pound! The BREN/WELD does work of conventional welders 4 or 5 times its size and weight . . . Actually delivers up to 250 amps at reduced duty cycle.

Simple to use, fully guaranteed, it operates on 110/220 volts AC, 50/60 cycles; handles electrodes from 3/64" to 5/32". Has adjustable arc voltage for different arc characteristics. Ideal for plant production and maintenance, for construction work, railroads, on the farm or home.

See your dealer or write direct for details of free trial offer!

24 hour delivery from stock!

KASSON

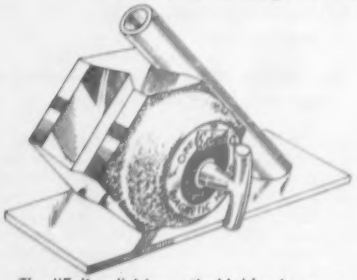
Manufactured by BRENNEN, BUCCI & WEBER, INC. New York City

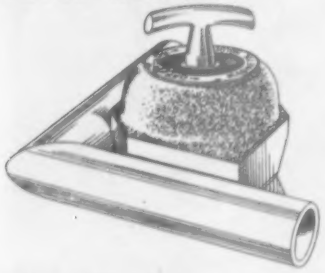
SALES DIVISION KASSON DIE & MOTOR CORPORATION Integrity Since 1919 32-14 NORTHERN BOULEVARD, LONG ISLAND CITY 1, N. Y.

Eclipse

MAGNETIC HOLDER

For holding work to be welded





The "Eclipse" Magnetic Holder is a permanent magnetic device capable of exerting a most powerful grip on steel plates, bars or tubes. Just a TWIST OF THE WRIST sets up a magnet field which . . . makes a strong, rigid jig. A versatile holder to save time and eliminate costly fixtures. Distributor inquiries invited.

Only **$69.50**

Order from

L. H. CHAPPEL AND *Company*

1137 POST ROAD
FAIRFIELD, CONN.

cut weld cleaning time by 85%

Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time — P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke, odors, or fumes.

P-O-M No. 2. Non-inflammable, non-toxic, water-soluble paste. Inorganic. Thin before applying and start welding at once. $3.25 per gallon, f.o.b. Dayton.

P-O-M No. 8. Rust- and corrosion-resistant resin base compound. Comes ready to use. Safe for all metals. Good paint primer; permits outdoor storage of sub-assemblies. $3.30 per gallon, f.o.b. Dayton.

MONEY-BACK TRIAL OFFER

Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

PROTECT-O-METAL

G. W. SMITH & SONS, INC. 5408 KEMP ROAD, DAYTON, O.

Technical program planned for ASTM annual meeting

The American Society for Testing Materials will hold its 58th annual meeting at Chalfonte-Haddon Hall in Atlantic City, N. J., from June 26 to July 1.

A total of 30 sessions will be held during the five-day meeting. Included will be symposiums on impact, high purity water corrosion, speed of testing and metallic materials for service above 1,600 F. Individual papers and lectures will be discussed at other sessions.

* * *

Linde starts expansion of laboratory facilities

Two new buildings are being constructed to house the expanded research and engineering activities of Linde Air Products Co.'s laboratories at Tonawanda, New York. Construction started late last year and is expected to be completed by this fall.

* * *

Distributor appointments

Alloy Rods Co., York, Pa.: Peerless Supply Co., Inc., Shreveport, La.; Sanders and Stewart, Inc., Jackson, Mich.

Carboloy Dept. of General Electric Co., Detroit: Harris Hardware & Supply Co., Inc., Kingston, Pa.; B-H Tool & Supply Co., Detroit; McKee Tool & Supply Co., Lima, Ohio.

Cooper Alloy Corp., Hillside, N. J.: The Cameron & Barkley Co., Charleston, S. C.

General Electric Co.'s Welding Dept., Schenectady, N. Y.: Weld-Arc Sales and Supplies, Inc., New York City; Interstate Welding Supply Corp., Elizabeth, N. J.; T. H. Green Co., Rochester, N. Y.

Kaiser Aluminum & Chemical Corp., Oakland, Calif: R. Lavin & Sons, Inc., Chicago; William M. Orr Co., Inc., Pittsburgh.

Visit WELDING ENGINEER's

Booth 102 at the

WELDING SHOW

MUNICIPAL AUDITORIUM

Kansas City, June 8 - 10

C. P. Sander, general superintendent of the Consolidated Western Steel Div., U. S. Steel Corp., Vernon, Calif., has been appointed a member of the technical council of the American Welding Society's board of directors. He is second vice-president of AWS.

* * *

H. H. Reed, district manager of the Metropolitan District, New York, of Air Reduction Sales Co., has been appointed national accounts manager. *O. M. Donohue*, Metro district sales manager, has been appointed district manager to replace Mr. Reed. Mr. Reed started with Air Reduction in 1923. Mr. Donohue has been with Airco since 1925.

* * *

Ernest L. Mathy has been elected to the board of directors and appointed vice-president and general manager of National Welding Equipment Co., San Francisco. Mr. Mathy has been connected with the welding industry for over 30 years.

* * *

Kenneth A. DeLonge has been placed in charge of the iron and non-ferrous castings section of the Development and Research Div. of The International Nickel Co., Inc., New York City.

* * *

Floyd V. Snodgrass has been elected vice-president in charge of production of the Walworth Co., New York City. Before joining Walworth, he was works manager and assistant to the vice-president of Pacific Car and Foundry Co.

* * *

E. Weldon Schumacher, vice-president for operations, has been elected president of the American Optical Co. He succeeds *Walter A. Stewart*, who retired.

a NEW product . . .
means NEW time saving . . .
important NEW production gains!

York's
SPAT-R-PRUF
COMPOUND 106

Don't sputter about spatter . . .
JUST WIPE IT OFF!

Completely eliminates grinding after welding. Just one coat, and spatter can be wiped away with a dry cloth.

Available 1 or 5 gal. cans, 5 gal. drums

- NO STIRRING OR DILUTION
- NON-TOXIC
- NON-INFLAMMABLE
- NO ODOR
- HARMLESS TO SKIN
- PERFECT PAINT BASE
- HELPS PREVENT RUST
- NO WELD POROSITY

YORK ENGINEERING CO.
3349 W. Ogden Ave., Chicago 23, Ill.

3 in 1 York's '77'
SPECIAL FLUX
FOR GENERAL BRAZING
FOR CAST IRON WELDING
FOR CAST IRON BRAZING

there's a
MANGANAL
T. M. Reg. U. S. Pat. Off.
11%-13½% Manganese-Nickel Steel
Special Shape Applicator Bar
TO FIT EVERY WORN TRACTOR GROUSER

- Outlasts new parts—costs less.
- Cuts down-time—reduces maintenance costs.
- Replaces worn metal faster.
- Reduces impact and abrasive wear. Work-hardens, too!

Want to know how to repair worn tractor parts fast? Write for free folder.

STULZ-SICKLES CO.
SOLE PRODUCERS 92 N. J. RAILROAD AVE. NEWARK, N. J.
NEAREST DISTRIBUTOR UPON REQUEST

THE MOST ADVANCED AUTOMATIC FLUXING SYSTEM EVER OFFERED FOR BRAZING

EASY WAY TO LOW COST

• All-State "Jet Flux" Auto-Dispenser No. 1 as you get it from the factory . . . is a pressure cylinder complete with automatic dispenser, controls, and hose with connections . . . ready to tie in, without special tools, to single or multiple brazing stations.

• Only one supply item — All-State "Jet Flux"—fluxes brazing work automatically through the fuel gas.

See "Jet Flux" demonstrated at the Welding Show

A-S DISTRIBUTORS EVERYWHERE

All-State

ALL-STATE

WELDING ALLOYS CO., INC.
White Plains, N. Y.

Clarence B. Dewees, a sales engineer for Linde Air Products Co. in the Chicago district since 1936, has been assigned to the Los Angeles district. Mr. Dewees started with the company in 1924 and became assistant district manager in Chicago in 1929. He has been active in Chicago Section activities of the American Welding Society.

* * *

Vincent E. Lysaght has been appointed general sales manager of the American Chain & Cable Co. Inc., New York City. He was formerly divisional manager of the company's Helicoid, Campbell Machine and Wilson Div.

* * *

F. L. Whitney, Jr., Monsanto Chemical Co., St. Louis, was elected president of the National Association of Corrosion Engineers at the recent annual conference in Chicago. *T. P. May*, International Nickel Co., New York City, was named to head the association's publications committee, and *Arthur W. Tracy* was appointed chairman of the editorial review subcommittee.

* * *

Jack J. Jarms has been named to fill the newly-created job of welding-positioner specialist for the Harnischfeger Corp., Milwaukee. Mr. Jarms will be in charge of coordinating "P&H" welding positioner sales, and sales policy between the home office and district managers and salesmen; and between distributors and salesmen.

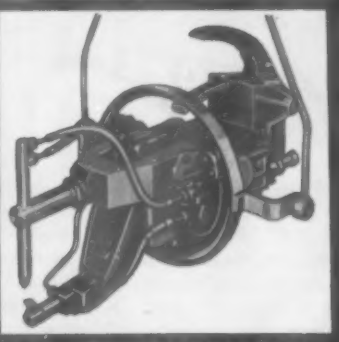
* * *

Bert L. Snell, former midwestern district sales manager in Chicago for the Luria Engineering Co., has been appointed vice-president of the affiliated Luria Construction Corp., Bethlehem, Pa. The engineering company also promoted *Edwin H. Webster* to vice-president in charge of production and purchasing.

* * *

William P. Brotherton has been promoted to public relations manager of Ryan Aeronautical Co., San Diego.

BOOTH 276
Kansas City, June 8-10
WELDING SHOW



ARO

PORTABLE SPOT WELDERS

• With And Without Automatic Timer.
• Adjustable Pressure
• High Duty Cycle

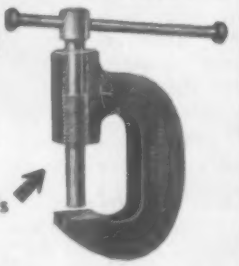
Dealer Inquiries Invited

AIR & WATER COOLED MODELS

ARO SPOT WELDERS INC.
67 Hamilton Pl., N. Y. 31, N. Y.

"Red Head"
WELDING CLAMPS

• Designed for Welding •



No Threads To Damage

1. Case hardened threads are always protected from weld spatter and never exposed to damage in open or closed position.

2. The clamp body is cut from solid plate, thereby insuring extreme rigidity and giving great resistance to bending or twisting.

3. Heat treated chrome molybdenum alloy handle offers great resistance to bending.

23 stock sizes

CHICAGO BOILER COMPANY
1968 CLYBOURN AVENUE
CHICAGO 14, ILLINOIS

sellstrom
safeguards
designed for comfort

"Viking" Fibre Glass Helmet — New Self-Finish Gray

No. 233

This new Fibre Glass Helmet is really a "tuf hombre". On the basis of the drop ball test, it is five times stronger than the ordinary fibre helmet. It combines extraordinary ruggedness and stamina, assuring long life and unusual service. The outside is a smooth self-finish gray, preferred by many welders. It does not show ordinary dust spots and the color cannot wear off. The inside has a dull black finish to eliminate reflections. Here are additional specifications:

1. Fibre Glass has no grain, therefore no weak spots.
2. Does not transmit heat. Keeps welder cooler. Has elasticity to withstand rough treatment. Will not absorb moisture, therefore holds its shape.
3. Equipped with new improved Sel-O-Matic ratchet type headgear; has larger and stronger teeth. Easily repaired if necessary; adjustable to fit any head. New popular Lift Front plate holder.
4. Headgear and plate holder are interchangeable with any of the other headgears and plate holders listed in the Sellstrom catalog.

Fibre Glass Welding Helmets are constantly growing in popularity. This gray helmet should be an outstanding winner, should meet with instant popularity among welders.

Our guarantee of this helmet is backed by more than 30 years' experience in designing and manufacturing every type of eye and face safeguards.

Order from your Sellstrom dealer. Or write us for a sample No. 233 Fibre Glass Helmet on memo for test purposes.

sellstrom
MANUFACTURING COMPANY

Eye and Face Safeguards Designed for Utmost Comfort

226 Hicks Road — Palatine, Illinois

Among recent changes at Babcock & Wilcox Co., New York City, were the following: *C. H. Kibler* has been promoted to general traffic manager and *Neil Robertson* has been named his assistant for the Boiler Division. *Harold Kenney* has been appointed head of all accounting in the manufacturing department of the same division, and *Harry Euverard* will assist him. At the Tubular Products Div., *George W. Kross, Jr.* has been promoted to superintendent, and *Carl J. Stoops* has been named his assistant. *J. N. Rogers* has been assigned district salesman to the St. Louis office.

* * *

Wendell Jones has been appointed plant manager of Burdett Oxygen Co.'s Youngstown, Ohio branch. He is a member of the American Welding Society. Mr. Jones has served with both the Cleveland plant and Youngstown branch for several years.

* * *

Wallace A. Altgilbers and *Thomas E. Rost* have been promoted to chief time study engineer and chief draftsman respectively for Edward Valves, Inc., East Chicago, Ind., which is a subsidiary of Rockwell Mfg. Co.

* * *

Leslie L. Andrus, vice-president of the corporation and executive head of its Dust & Fume Control Div., was elected to the board of directors of American Wheelabrator & Equipment Corp. He has been with the firm since 1934. *Harold M. Miller* and *Ray P. Whitman* were also named to the board.

* * *

Gordon F. Witt has succeeded *Harry L. Sturla* as field representative for the tubular products and cold finished bar department at the Milwaukee plant of Joseph T. Ryerson & Son, Inc. Mr. Sturla has been transferred to the Chicago plant. *Hugh F. Lacey* has been appointed traffic manager. He takes over for *Carl Kuhn* who recently retired. *John J. McKeown* replaces *F. C. Wendorf* as manager of the work order department at the Milwaukee branch.

* * *

C. Richard Fassinger, secretary; *John N. Petro*, treasurer; *H. E. Sahli*, vice-president; and *Leslie Pfeil*, president, now constitute the executive committee and board of directors of Universal Welder Corp., Cleveland.

NO TWO WAYS ABOUT IT...

HARRISBURG STEEL DOES OFFER MORE TO CYLINDER USERS

- **QUALITY PRODUCTS**—Harrisburg Steel manufactures top-quality cylinders in a complete range of sizes and capacities, from 14 to 400 cubic feet . . . in both Domestic and Export types . . . to I.C.C. specifications.
- **TECHNICAL SERVICE**—If you have problems concerning transportation of fixed or liquid gases, or any cylinder problem whatsoever, consult Harrisburg Steel. They have, or will find the answer.

Write today for a catalog and prices.

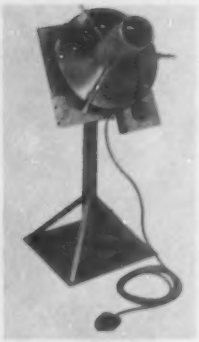
HSC-W-4/54

101 YEARS IN PENNSYLVANIA'S CAPITAL

Harrisburg Steel
CORPORATION

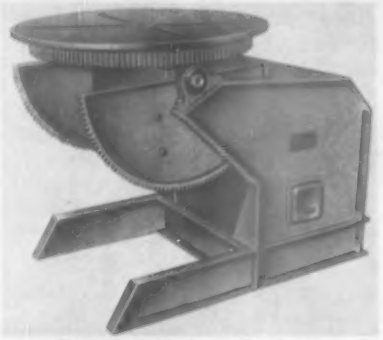
HARRISBURG 15, PENNSYLVANIA

Positioning produces STRONGER, CLEANER, BETTER WELDS *in less time by eliminating* HANDLING



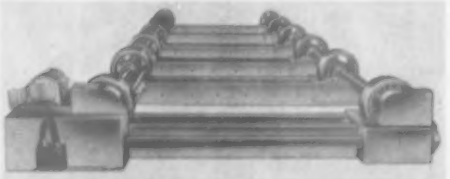
Light-duty Bench

Visit us at
Booths 147 and 148
Welding Show
Municipal Auditorium
Kansas City
June 8-10



Precision Gear-driven Positioners

Powered Turning Rolls and Idlers



Frame Base Powered Turning Rolls

Specializing in Custom Equipment
Write for Catalogue No. 548

UNIQUE TURN TABLE & EQUIPMENT CORPORATION
1125 IRVING AVENUE BROOKLYN 27, N. Y.

Group of RUEMELIN Fume Collectors Keeps Shop Clear of Welding Fumes

This well ventilated welding department is typical of hundreds of similar installations. Welding operators appreciate smoke and gas-free atmosphere. Thousands in service. Many repeat orders. Collecting fumes AT THE SOURCE with local exhaust hoods has proven most practical in operation. It is particularly helpful in winter months when doors and windows are closed. Write for Bulletin 37-D describing all types of Ruemelin Welding Fume Collectors.

RUEMELIN MFG. CO.
MFRS. & ENGRS. • SAND BLAST & DUST COLLECTING EQUIPMENT
3880 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

A-5911-55-R3

Frank R. Chase has been named sales manager for the industrial division of the Torit Mfg. Co., St. Paul, Minn. Mr. Chase was sales promotion manager for Multi-Clean Products Co. before joining Torit. He will be in charge of sales and advertising for the dust collector products.

* * *

George B. Secor has been named assistant to the president of Gregory Industries, Inc., Toledo. Before attaining this position he was a director of the company and special sales consultant to the Nelson Stud Welding Div.

* * *

Jack D. Tolliver has been appointed manager of the recently established sales development division of Tube Turns, Louisville, which is a division of National Cylinder Gas Co., Chicago. The new division replaces the Engineering Service Div.

* * *

George W. Jernstedt has been appointed director of a new manufacturing laboratory of the Westinghouse Electric Corp., Pittsburgh. The company also named *Frank R. Benedict* as manufacturing - engineering manager for the Sturtevant Division.

* * *

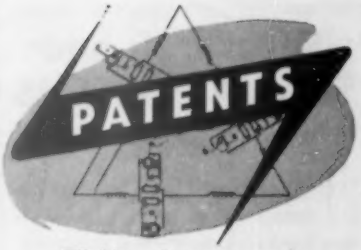
Included in Solar Aircraft Co.'s recent transfers between the San Diego and Des Moines, Iowa, plants are *Bruce A. Willsey* to assistant plant manager at Des Moines, *Clyde W. Seymour* to manufacturing manager of the San Diego plant, and *Marvin L. Nelson* to assistant manufacturing manager in San Diego. Also, *Cyril D. Oberg* has been named manager of aircraft and engine component sales at San Diego. *William F. Cords* is his assistant. *Kent M. Campbell* will head the firm's new product sales department.

* * *

Francis D. Holden has been appointed manager of sales of Macwhyte Co., Kenosha, Wis. He has been assistant general sales manager since Dec. 1, 1948.

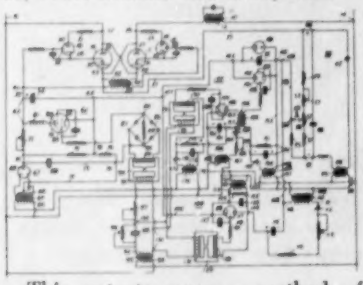
* * *

John H. Faunce, Jr., recently became director of market and commercial development at Lukens Steel Co., Coatesville, Pa.



Welding-heat control

2,672,543. DONALD P. FAULK, Lexington, Mass. Assigned to Raytheon Mfg. Co., Newton, Mass. Filed Dec. 29, 1949. Granted March 16, 1954.



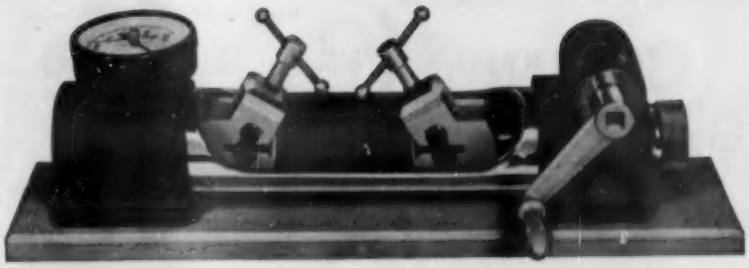
This patent covers a method of welding. The parts to be welded are urged together. An alternating electric current is produced in the region of the juncture. The current intensity is varied for a number of cycles, each cycle varying in intensity from a minimum value gradually increasing with time to a maximum value. This maximum value exists within only one period of the alternating current, then returns within one period the current to said minimum value.

* * *

Stud welding

2,670,424. HAROLD MARTIN, East Molesey, England. Filed May 26, 1950. Granted Feb. 23, 1954.

A method of end-welding metallic objects to metallic surfaces by electric arc welding is the subject of this patent. A conducting relation is established between one end of a metallic object having such end completely metallized with a metallic material of higher electrical conductivity than that of the object and selected from the group consisting of aluminum, titanium, vanadium and manganese and their alloys, and the surface to which it is to be welded. Welding current is passed through the object and the surface, forming an arc between them. The arc is maintained for a predetermined period so that the welding end of object and crater formed in the surface may acquire welding temperatures. The heated object is moved into contact with the crater. The curent flow in the welding circuit is maintained as long as necessary to secure a satisfactory weld.



For shop or field—a new

Portable Tensile Tester

Use this compact, precision tensile tester to test strip steel, wire, bolts, spot welds, or anything else within its 4,000 lb. capacity. Besides its use for inspection work in the shop, this portable device provides a convincing method of demonstrating the tensile strength of various materials in sales demonstrations and trade shows.

Only a moderate pull on the crank is sufficient to apply the maximum load. Results are easily read from the load gauge. Simple to use, anywhere, any time. Write for catalog sheet and price.

DETROIT TESTING MACHINE COMPANY

9380 Grinnell Avenue, Detroit 13, Michigan

AT THE FRONTIERS OF PROGRESS YOU'LL FIND

AN AIR REDUCTION PRODUCT

FOR WELDING AND CUTTING...

IN THE RED DRUM

HIGHEST QUALITY

DUST-FREE

NATIONAL CARBIDE

Write for the name and address of the NATIONAL CARBIDE supplier nearest you.

National Carbide Company

GENERAL OFFICES: 60 EAST 42ND STREET, NEW YORK 17, N. Y.

A DIVISION OF AIR REDUCTION COMPANY, INCORPORATED

TILLMAN

Gloves—Garments

WELDORS BUY FROM YOUR DEALER

ASK FOR OUR NEW CATALOG

BRAZILIAN DEERSKIN
THE "STAY SOFT" LEATHER
GLOVES AND MITTENS

TILLMAN PRODUCTS
John Tillman & Co.
Long Beach, Calif.

When You Weld Cast Iron Select the Correct

Fuse-Well

CAST IRON WELDING RODS OR ELECTRODES

FUSE-WELL NO. 11

FUSE-WELL No. 11, *Square*—Gray Cast Iron Welding Rod for Acetylene use in filling or building up new or worn castings producing machineable welds.

FUSE-WELL NO. 12

FUSE-WELL No. 12, *Round*—Has the same uses and analytical ingredients as Fuse-Well No. 11.

FUSE-WELL NO. 14 MOLY

FUSE-WELL No. 14, *Moly*—An Iron Base Rod with alloys added for finer grain structure and greater strength.

FUSE-WELL NO. 22

FUSE-WELL No. 22, *Electrode* — Light coated Rod to be used for AC or DC welding in the fabricating and repairing of cast iron castings.

Sold through Leading Distributors

THE CHICAGO HARDWARE FOUNDRY CO.
Weld Rod Division
NORTH CHICAGO, ILLINOIS

Butt welding machine

2,677,746. GABRIEL VICTOR ALPHONSE DUCH and MARIE ADRIENNE DUCH, nee Bernelin, Lyons, France. Filed Dec. 26, 1950. Granted May 4, 1954.

The subject of this patent is a universal machine. The jaws each include a base element and a cover element hingedly interconnected. The locking means holds the cover element in closed position. A matching semi-cylindrical recesses in the base element and cover element. Interchangeable half bushings have an inner curvature matching the outer curvature of the cable to be welded and removably engageable into the recesses. A centering stud is carried by the bushing engageable into the base element. A blind hole in the base element receives the stud. A screw-threaded rod is carried by the bushing engageable into the cover element recess. A bore through the cover element for the rods holds the latter bushing in the cover element recess.

This might be why your inquiry hasn't been answered

Still waiting for some material you requested through WELDING ENGINEER'S Info-Aid card?

It may be that your inquiry is still being processed. Then again, it may be that you omitted something on your card, making it impossible for WELDING ENGINEER to forward your request to the proper firm.

That is not so strange as it sounds. Within the past few weeks, we've received several cards from here in the United States and from Mexico that had no names or addresses listed on the Info-Aid card, although some numbers were circled.

We've also had cards sent to us recently from Tracy, Calif., Indonesia and Turkey on which none of the numbers were circled. What to send?

These examples are **typical,** *not exceptional!*

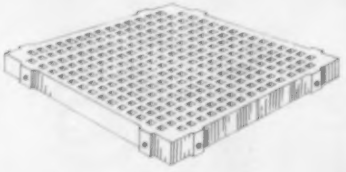
So, before you mail your Welding Info-Aid inquiry card, make sure you have filled it in properly and completely!

Please?

WELDING and SET-UP PLATENS

(Shipyard bending block type)

Floor plates—bending tables—layout tables—straightening tables—dog blocks—bending blocks—blacksmith blocks. 5'x5'—6'x6'—6'x8'—6'x10' — 5'x10' — 6'x12' — 3'x3' — either 6" or 7" thick.



Weldments dogged down to these planed semi-steel blocks stay flat during fabrication.

Write for low cost details.

STAHL EQUIPMENT CO.
94 Washington St.
Brookline Village 46, Mass.

"ANTI-BORAX"

"ROYAL"

CASE-HARDENING POWER

- More effective than cyanide. Gives off no dangerous fumes. Simplifies the work. Economical to use.
- Makes low-grade steel perform like high-grade steel.
- Enables the weldor or blacksmith to produce a finer cutting tool without technical equipment.
- Produces a .01 to .02 in. case depth with necessary Brinell toughness on large and small low-carbon steel tools and parts.
- Write for sample and descriptive booklet.
- Manufactured by the makers of "E-Z", & "Crescent", Welding Compounds and "Anti-Borax" Oxy-Acetylene Welding and Brazing Fluxes.

ANTI-BORAX COMPOUND CO. INC.
FORT WAYNE 9, INDIANA

30 YEARS AGO

(Taken from *The Welding Engineer* of May, 1925)

A. G. BISSEL of Westinghouse Electric & Mfg. Co. wrote the lead article, "Arc Welded Steel Building," in which he tells how welding not only cuts fabrication costs, but also makes possible use of discarded materials.

—30 YEARS AGO—

AIR Reduction Sales Co. opened a new acetylene plant in Kansas City, Mo.

—30 YEARS AGO—

THE Annual Spring Meeting of the American Welding Society was held in New York City for three days.

—30 YEARS AGO—

THE Alexander Milburn Co., believed to be the oldest exclusive manufacturer of welding and cutting apparatus and portable carbide lights, is commemorating its 18th anniversary.

—30 YEARS AGO—

R. K. RANDALL, superintendent of welding courses at the Y.M.C.A. in Cleveland, has contributed several items on welding to the *Cleveland Times*. His most recent story was "Brazing Fills New Place in Present Day Industry."

—30 YEARS AGO—

LINDE Air Products Co. recently opened new district sales offices in Minneapolis, Birmingham and Tulsa.

—30 YEARS AGO—

A RECENT issue of the *Iron Trade Review* features a brief biography of Charles L. Bastian of The Bastian-Blessing Co., Chicago.

—30 YEARS AGO—

THE Metal and Thermit Corp. of New York City has recently placed on the market a new brazing compound for use on cast iron work.

—30 YEARS AGO—

AN article entitled, "Torch Aids Trolley Upkeep" tells how gas welding solves a multitude of maintenance problems for street railways.

—30 YEARS AGO—

S. J. MELVILLE describes how an oil still was rebuilt by arc welding.

—30 YEARS AGO—

THE Electric Arc Cutting and Welding Co., Newark, developed a new welding generator which is said to have features that have not been incorporated in any welding or cutting apparatus before.

How Federal Helps Whirlpool

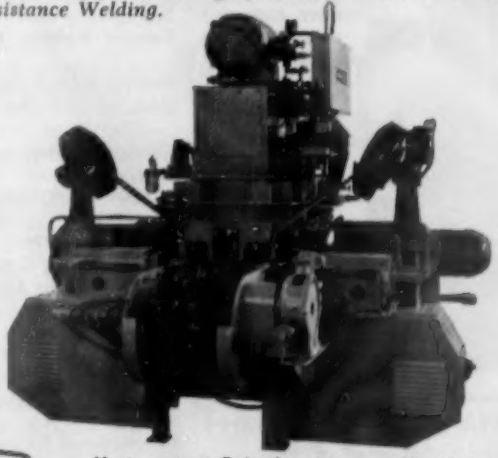
BUILD BETTER HOME LAUNDRIES

Mills, Welds, Tests 1,000 Washer Parts per Hour!

A special resistance welder designed by Federal is helping Whirlpool build better home laundries, faster at reduced costs.

It is believed to be the first machine to combine a milling operation with resistance welding. It also assembles three parts and performs a 100% test — completing 1000 finished assemblies per hour with one operator.

The assembly is a tub suspension rod, and is comprised of a length of rod, a bracket and two metal discs. The operator fits the bracket over the rod and drops it into a hopper — the machine does the rest. It carries the rod to a milling station where the rod ends are machined to proper radius for best projection welding. The two discs are hopper fed to the ends of the rod at the welding station. After welding the parts are automatically transferred to a test station where each assembly is given a 3000 pound "pull test." This is another example of how Federal's "know how" in resistance welding is paying dividends to one of America's leading manufacturers. Next time you're considering your welding operation — think of *Federal — First in Resistance Welding.*



Neat, compact Federal resistance welder that speeds production of tub suspension rods for Whirlpool.

Federal® WELDERS

Warco® PRESSES

The Federal Machine and Welder Company

WARREN, OHIO

Weld-O-Vent

"World's Finest Exhaust Systems"

Welding Fume Exhausters

MANY EXCLUSIVE FEATURES

- Portable and stationary units for all applications.
- Unlimited flexibility, fast, easy positioning, over 360° radius.
- Blowers can be attached to units or mounted at remote points connecting with ductwork.
- Units can be connected in series.

High Velocity Hood Quickly Removes Smoke and Fumes.

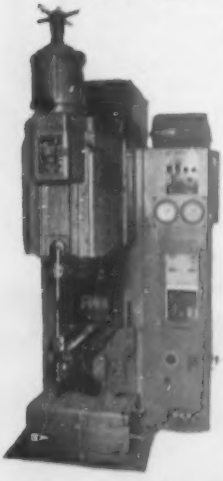
Available in 9, 12, or 16 foot reach units.

Write For New Application DATA . . .

Engwald Corporation
357 LAFAYETTE AVE.
BROOKLYN, N. Y.

SPECIAL PURCHASE

SAVE ½ ON THIS LIKE NEW 3 PHASE WELDER



USED TAYLOR-WINFIELD THREE PHASE PRESS TYPE SPOT WELDER; NEW 1946; Dry disc rectifier type; Reduced Demand; 65 KVA; 40,000 max. sec. amp.; Depth of throat 36"; 3 phase, 60 cycle, 220/440 volt; High Power factor; Roller bearing head; 10½" adjustable rectractable stroke cylinder; rated at 2 pieces .084 aluminum; certify for 2 pieces .062. aluminum; In perfect Condition.

300 KVA TAYLOR-WINFIELD
EP-12-30, AIR OPER. PROJ.; 12" throat; w/controls

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free literature . . . . . USE CARD ON OPPOSITE PAGE

1. BENCH GRINDERS—Poly Products Co. 8-page catalog describes the firm's complete line of bench grinders, arbors and sanding discs.

2. WELDING MACHINES—Airline Welding and Engineering. 4-page brochure depicts the various types of welding machines and accessories built by the company.

3. METAL COATINGS—Cakite Products, Inc. Booklet illustrates and explains the action of this firm's process in converting the steel surface into a complex, heavy phosphate layer chemically bound to the metal.

4. ELECTRODES—Ampco Metal, Inc. Bulletin W-26 describes new electrode for use in the metal-arc welding of manganese bronze and the yellow brasses without preheat.

5. WELDING TECHNIQUE—The M. W. Kellogg Co. 12-page pamphlet includes feature story on step-by-step process of a new welding techinque for power piping.

6. VISES—Wilton Tool Mfg. Co. Inc. Catalog sheet 662 covers new machinists' bench vises including all the recent design changes.

7. PUMPS—Allis-Chalmers Mfg. Co. Bulletin 08B8233 describes construction features of a new pump developed for air conditioning and general-purpose applications.

8. ARC WELDER—Harnischfeger Corp. Bulletin W-96-1 describes and gives specifications on this new lightweight, air-cooled, engine-driven arc welder.

9. PRE-CLEANING—Vacu-Blast Co., Inc. Bulletin 54 tells advantages and applications of the firm's process and cites letters of commendation.

10. WELDING TORCH—Acme Welding Supply Co. Retail Price List No. 2 gives price information on firm's atomic hydrogen welding torch.

11. RESISTANCE WELDERS—A. R. O. Machinery Co. Ltd. Leaflet gives specifications on the company's various models.

12. INDUSTRIAL FILMS—United States Steel Corp. Catalog describes industrial motion pictures that are available on a free loan basis.

13. PLASTIC TOOLING—The Marblette Corp. 20-page handbook depicts the fabrication and indicates the uses of such plastic tools as spotting racks, checking and inspection fixtures, welding and assembly fixtures, etc.

14. HANDSCREWS—Wetzler Clamp Co. Leaflet tells about and gives specifications on improved types of handscrews.

15. ENGINEERING IRONS—The International Nickel Co., Inc. 28-page Bulletin A-69 presents the characteristics of modern nickel cast irons and illustrates their acceptance throughout industry.

16. ELECTRODE—Mir-O-Col Alloy Co., Inc. Leaflet emphasizes new welding electrode and also describes the company's other products.

17. TIG WELDING—Air Reduction Co., Inc. Catalog 2300 tells applications, methods and advantages of the process and also depicts various accessories.

18. TITANIUM BASE ALLOY—Mallory-Sharon Titanium Corp. 4-page pamphlet uses words, pictures and tables to describe a ternary titanium alloy with 3% aluminum, 5% chromium and less than 0.1% carbon.

19. RESISTANCE WELDING—The Taylor-Windfield Corp. No. 5412 of "Weld-It" gives illustrated information about the company's various types of welding machines.

20. ELECTRODE DRESSERS—C. O. Porter Machinery Co. 4-page illustrated brochure describes electrode dressers for resistance welding.

21. AIR CYLINDERS—Miller Fluid Power Co. 8-page Bulletin A-105K gives complete, up-to-date design, construction, engineering, mounting and dimensional data on the firm's heavy duty air cylinders.

22. GAS ANALYZERS—Mine Safety Appliances Co. 20-page brochure, No. 0703-3, gives information on the firm's complete line of combustible gas analyzers and alarms.

23. WELDERS—Sciaky Bros., Inc. 8-page Bulletin 318-1 includes application stories, photographs, schematic drawings and tabular data about three new designs of spot and projection welders.

24. WROUGHT IRON PIPE—A. M. Byers Co. 52-page manual contains technical data, more than 25 tables list size and dimensions, of interest to specifiers of pipe and tubing.

25. AIR ENGINEERING—Ingersoll-Rand Co. "A Better Air Power System," Form 213-A, tells, step by step, the procedures to be taken to bring this system up to accepted standards.

26. STEEL—The International Nickel Co., Inc. Bulletin A-61 describes high-strength, low-alloy steels—their characteristics, their corrosion resistance, how they are formed and worked and their design factors.

27. WELDING PUMPS—American Manganese Steel Div. 12-page booklet describes repair welding on dredge pumps and fittings.

28. MIG WELDING—Westinghouse Electric Corp. 7-page booklet, B-6525, tells the performance and application of a new consumable-electrode inert-gas welding process.

29. BUS CONDUCTORS—Kaiser Aluminum & Chemical Corp. 12-page publication gives information on these aluminum electrical conductors.

30. BRAZING—Air Reduction Sales Co. 24-page manual is concerned with the application of the major brazing methods in joining metals using silver alloys and filler metals, fluxes and gas atmospheres.

31. WELDING DATA—The Burdett Oxygen Co. Pamphlet gives price information on the firm's welding, cutting and safety equipment.

32. RESISTANCE WELDING—Sciaky Bros. Vol. 4, No. 5 of "Resistance Welding At Work" describes facilities for overhaul and modification of Norton Air Force Base.

33. ALLOY STEELS—Climax Molybdenum Co. 200-page handbook is designed for those who are interested in the practical utility of alloy steels in modern equipment design.

34. STUD WELDING—Nelson Stud Welding. Reprint from the *Iron Age* tells how fabricator lowers tooling costs and improves productivity through the wide use of stud welding.

35. FLAME-CUTTING—Flame Cutting Equipment Co. Pamphlet gives information on flame-cutting with propane.

36. ELECTRODES—Pacific Welding Alloys Mfg. Co. Descriptive pamphlet concerns itself with two new electrodes for underwater cutting and welding.

37. LEAK DETECTOR—American Gas & Chemicals, Inc. Leaflet tells about non-inflammable, non-explosive and non-injurious device for detecting gas and air leaks.

38. SOLDER—Anchor Metal Co. Leaflet tells about solder that comes in "squeeze bottle" and cleans, tins and sweats all in one.

39. SPOT WELDERS—Ames Spot Welder Co., Inc. Sheet depicts and gives specifications on the company's rocker-arm spot welders.

40. A-C, D-C WELDER—The Lincoln Electric Co. Pamphlet gives six advantages of new welder with four types of arc.

41. STUD WELDING—Nelson Stud Welding. 6-page folder gives detailed methods for the stud welding of standard concrete anchors for curbing, column guards, protective platform installations, etc.

42. BRAZING—Handy & Harman. Bulletin 17 gives instructions for brazing fittings to pipe and tubing.

43. CONNECTIONS—Erico Products, Inc. Folder gives information and specifications for cable connections for cathodic protection.

44. ANODES—Standard Magnesium Corp. Illustrated brochure describes cylindrical magnesium anodes for corrosion control.

45. X-RAY SLIDE RULE—Machinery & Welder Corp. X-ray slide rule is for determining voltage, time, thickness or distance requirements for steel.

46. WELDING NEWS—National Electric Welding Machines Co. Volume 9, No. 2 depicts automatic welders that perform operations fast and accurately for time-saving, labor-saving production.

47. D-C MOTORS—Reliance Electric & Engineering Co. 12-page illustrated bulletin describes the company's new d-c motors with dynamic response.

48. RESINOID PRODUCTS—Bay State Abrasive Products Co. 21-page booklet uses charts, illustrations and words to describe the firm's various products.

WELDING INFO-AIDS

USE THIS CARD for Literature, Catalogs, and Bulletins shown on facing page, and for those featured in this month's ads as listed on next page

Also information about

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12 East Grand Avenue
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literature offered in advertisements in this issue:

101. Air Reduction Sales Co.—Data on inert-gas welding processes in Aircospot Catalog 2315 and Heliwelding Catalog 2300.
102. Air Reduction Sales Co.—Information on tungsten electrodes and filler wire for Heliwelding.
103. Alloy Ring Service, Inc.—Data on brazing rings, preformed shapes in silver alloy, copper and soft solder and flux.
104. Alloy Rods Co.—Bulletin on "Atom-Arc" all-position iron powder, low hydrogen electrode.
105. Alloy Rods Co.—Information on "Bronze-Arc C" electrodes for x-ray quality welds.
106. Aluminum Co. of America—176-page text covering aluminum welding.
107. American Brass Co.—Publication B-13 on "Anaconda" welding rods and recommended welding procedures.
108. Anti-Borax Compound Co., Inc.—Booklet on "Royal" case-hardening powder.
109. Arcos Corp.—Bulletin on "Arcosite" flux and stainless steel wire.
110. Bridgeport Brass Co.—Folder on bronze rods for braze welding.
111. Burdett Oxygen Co.—Information on "Beaver" portable cutting machine.
112. Carborundum Co.—Folder on "Carboflex" depressed center wheels.
113. Carborundum Co. — Booklet on "MX" abrasive products.
114. Carborundum Co. — Brochure on "Port-A-Belt" grinding attachments.
115. Chappel Co., L. H.—Information on "Eclipse" Magnetic Holder for use on steel plates, bars or tubes.
116. Crucible Steel Co. of America—Booklet on stainless steel welding wire.
117. Detroit Testing Machine Co.—Catalog sheet and price on portable tensile testers.
118. Drawalloy Corp.—Information and prices on stainless steel wire for automatic and semi-automatic welding.
119. Erico Products, Inc.—Catalog and information on Caddy electrode holder test installation program.
120. Eutectic Welding Alloys Corp.—Booklet "How to Overcome Your Welding Problems."
121. General Electric Co. — Bulletin GEA-6242 on G-E Rectifier Welders.
122. General Electric Co. — Booklet GEA-6243 on G-E AC Welders.
123. General Electric Co. — Brochure GEC-664, G-E MG Welders.
124. General Electric Co. — Electrode Selector Chart, GEC-657.
125. Handy & Harman—Distributor list for "Easy-Flo" and "Sil-Fos" brazing alloys.
126. Harrisburg Steel Corp. — Catalog and prices on complete range of cylinders.
127. Hewitt-Robins, Inc. — Information on hose and industrial rubber products.
128. Hobart Bros. Co.—Information on CV "Powromatic" and heads for automatic welding.
129. Hobart Bros. Co.—Complete details on simplifying automatic welding.
130. Hobart Bros. Co.—Catalog on simplified arc welders.
131. Hobart Bros. Co.—Information on various types of welders.
132. International Nickel Co.—Folders on "Ni-Rod" and "Ni-Rod '55' " electrodes.
133. Invincible Vacuum Cleaner Mfg. Co.—Folder on flux recovery with illustrated case histories on time and money-saving installations.
134. K-G Equipment Co., Inc.—24-page catalog on single stage regulators.
135. Kasson Die & Motor Corp.—Details of free trial offer on "Bren Weld" portable arc welder.
136. Lincoln Electric Co.—Bulletin 1343 on "Idealarc" combination welder and "Jetweld" electrode.
137. Lindberg Engineering Co.—Brochure 1441 on induction unit for reducing brazing costs.
138. Machinery & Welder Corp.—Details and prices on "Fedrex" X-ray unit for spot checking welds.
139. Mallory & Co., P. R.—Catalog on resistance welding electrodes, holders, forgings and accessories.
140. Metal Bond Mfg. Co.—Pocket-size catalog containing information and descriptions of soldering and welding products.
141. Miller Electric Mfg. Co., Inc.—Complete information on gasoline engine driven welder/power plants.
142. National Cylinder Gas Co.—Descriptive bulletin on "Sureweld" iron powder electrodes.
143. National Welding Equipment Co.—Illustrated 44-page regulator brochure.
144. Page Steel & Wire Div.—Folder DH-402 listing 26 automatic welding wires.
145. Rankin Mfg. Co.—Bulletin containing special instructions for rebuilding with hard-facing materials.
146. Ruemelin Mfg. Co.—Bulletin 37-D describes various types of welding fume collectors.
147. Stulz-Sickles Co.—Folder tells how to repair worn tractor parts.
148. Sylvania Electric Products, Inc.—Technical information on tungsten electrodes for inert-gas welding.
149. Tempil Corp.—Sample pellets for indicating temperatures.
150. Titan Metal Mfg. Co.—Folder describing welding rod compositions and uses.
151. Torit Mfg. Co.—Catalog on unitized dust collectors.
152. Unique Turn Table Corp.—Catalog No. 54B on positioners and turning rolls.
153. United States Steel Corp.—Complete information on "T-1" Steel.
154. United Wire & Supply Corp.—"Phoson" folder for brazing pressure piping.
155. Westinghouse Electric Corp.—Folder on Westinghouse electrodes.
156. Worthington Corp. — Bulletin R1700S11 on world's largest welding positioner.
157. Engwald Corp.—New data on welding fume exhausters.

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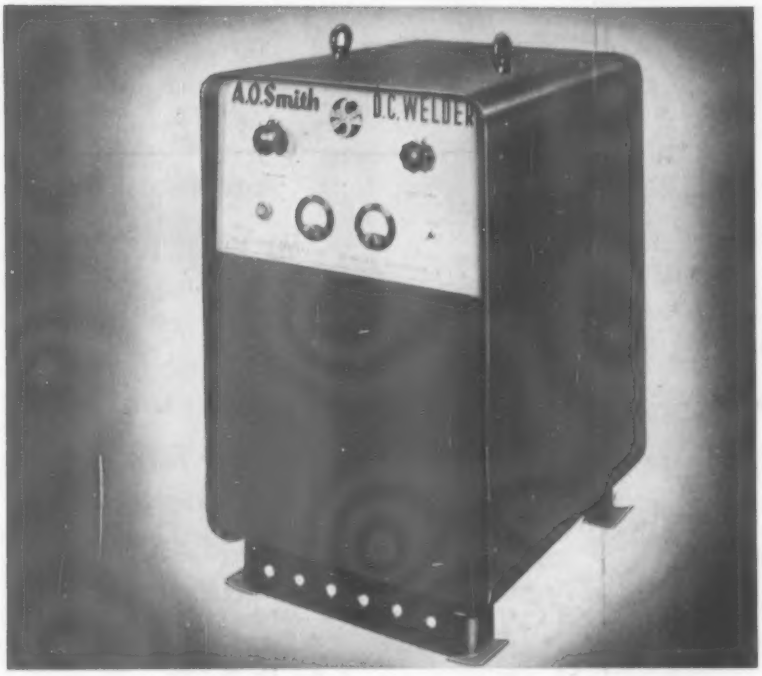

This brilliant new 600-amp machine ready to change performance standards in submerged arc and inert gas welding

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It's a great new Constant Potential power source. Carefully engineered by A. O. Smith, the machine reflects the ideas of users as well as manufacturers of automatic welding equipment. It offers you all the advantages of other Constant Potential units—plus important advancements that will pay off on your jobs.

FULL 600 AMPS

The unit actually delivers up to 44% more power than comparable machines. This is a significant feature for anyone who wants to make use of the full-range flexibility of automatic welding. More power means more pounds of weld metal deposited per hour.

A broader voltage range is yours, too, with A. O. Smith's new Constant Potential unit . . . from 0 to 45 volts — a spread unequalled by any other machine. Another feature that helps you get more performance from your automatic welding head.

NO MORE "BURN-BACKS"

Whenever arc voltage goes beyond 45 volts, the machine shuts off immediately. There is never any time lost rethreading or replacing heads damaged by "burn-backs". What's more, voltage is maintained with far less "drop-off"!

Better regulation of voltage is a result of experience gained in A. O. Smith's own fabricating shops. Many months of on-the-job testing went into the development of the best possible design . . . the most favorable copper-to-iron ratio.

LIGHTNING STARTS

With this new unit on the job, you virtually eliminate starting problems. This is true, because the machine develops full-power for welding instantly. Think of what this means in terms of preventing damage due to "sticking." Think of what it means for faster welding.

ACCESSORY POWER SUPPLY

A worthwhile "extra" that's yours at no extra cost is a built-in 110-v., power supply. You can use plug-in accessories right from the start. There's no need to wire up or search for the closest proper outlet.

Through research . . . a better way

A.O.Smith
CORPORATION

WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin
International Division: Milwaukee 1

Everything for welding is yours from A. O. Smith

We offer you a welder-proved line of a-c and d-c machines . . . electrodes . . . accessories.

See your A. O. Smith representative for all the facts about the new Constant Potential power source . . . or write A. O. Smith Corporation, Welding Products Division, Milwaukee 1, Wis.